A McGraw-Hill Publication
San Francisco, Calif.

July 15, 1925
25 Cents

Journal of Electricity

Devoted to the Economic Production and Commercial Application of Electricity
IN THE ELEVEN WESTERN STATES

Get This! The Greatest Moving Flashing Window Display Ever Made!

No dealer's "selling help" we ever produced ever scored the instantaneous success of our latest moving, flashing Hold-Heet window sign. Think of a full size eight color cut-out sign that shows a woman using one of the famous Hold-Heet irons. While it glides the iron over the clothes with obvious ease, it also "flashes" a selling message that positively sells irons in a hurry. It works without attention day or night; it is the only electric combination moving and flashing sign in existence. Simply connect it to your electric circuit and it will start its job of attracting lookers to your window and buyers to your store. Once you get this trade magnet in your window, you will keep it there because it will sell more Hold-Heet irons for you than you ever thought possible.

It Moves! It Flashes! It Sells Goods!

You Can Get One Free!

This remarkable sign costs us real money because it's a real sign. Yet you can get one without expense. Your Hold-Heet jobber has a special deal on Hold-Heet irons—a liberal offer that you cannot afford to ignore if you want to sell a whole lot of irons this year. Ask him to tell you how you can get one of these moving, flashing signs, worth at least $15, without cost to you. Don't delay. See your Hold-Heet jobber today or write to us direct. Remember this sign is not something that **might** build business—hundreds of dealers have proved its power. It wins for them—it will win for you. Act now.

RUSSELL ELECTRIC COMPANY

The World's Largest Manufacturers of Lamp Socket Heating Devices

340 W. Huron Street **Chicago, Ill.**

$500,000!

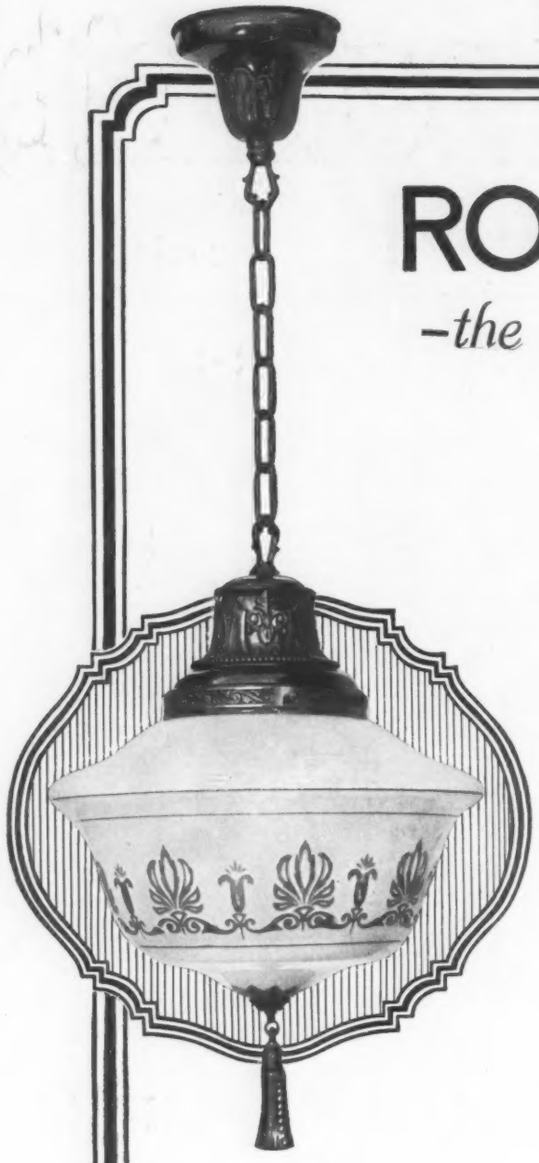
The Largest Order Ever Placed for Consumer Advertising In Electrical Appliance History!

A perfect avalanche of Hold-Heet consumer advertising will start August 15th in Liberty, the fastest growing magazine in America. It has but one object—to put Hold-Heet merchandise 'way out in front—**and to keep it there!**

Pages and double pages—all in four colors—millions upon millions of individual advertisements—all helping you sell Hold-Heet appliances. Liberty has a weekly growing circulation of over 1,100,000 copies now—it will be double this in a year. Our campaign covers three and a half years and grows bigger and stronger as the Liberty circulation mounts. This stupendous campaign has time, power and size in its favor. If you want to make more money from more appliance sales than you ever made in your life, this is your opportunity. See your Hold-Heet jobber today—it will be an act of kindness to your bank account.

Hold-Heet

With the Famous Guaranteed Hold-Heet Element



ROCKBESTOS

–the asbestos covered wire

Thousands of these MILLER pendants for Trojan units using Mazda C lamps are turned out every week. They must be right in every respect.

ROCKBESTOS

Asbestos Covered Fixture Wire

meets every condition for use in such Mazda C units. It is durable, will not burn, and never deteriorates under any condition. Can be had in colors to match any kind of fixture finish.

The better fixture manufacturers are using Rockbestos—the everlasting wire.

No. 589
Miller Pendant
with Trojan Unit

To Dealers and Manufacturers

Samples of our asbestos covered wire will be sent on request, and prices made for your requirements.

BAKER-JOSLYN COMPANY

Distributors of Electrical Equipment and Construction Materials

LOS ANGELES **SAN FRANCISCO**

Journal of Electricity entered as second class matter February 17, 1921, at the post office at San Francisco, under the Act of Congress, March 3, 1879.
Published the 1st and 15th of each month, at 883 Mission Street, San Francisco, California.

JUL 23 1925 ©CIB664594

Journal of Electricity

With which is consolidated the "Electrical Journal" and the "Journal of Electricity, Power & Gas."

Devoted to the Economic Production and Commercial Application of Electricity

IN THE ELEVEN WESTERN STATES

A McGraw-Hill Publication

Published Semi-Monthly

Established 1887

C. T. HUTCHINSON, Editorial Director
G. C. TENNEY, Managing Editor

J. W. OTTERSON, Associate Editor
G. R. HENNINGER, Associate Editor

R. N. PHELAN, Associate Editor
B. H. SNOW, Northwest Editor

VOLUME 55 SAN FRANCISCO, JULY 15, 1925 NUMBER 2

Contents

Editorials 39

State Versus Federal Regulation 43
By HERBERT C. HOOVER

The author is convinced that the best interests of the public are served when the ownership, control and regulation of electric utilities are within the district of operation. In Secretary Hoover's opinion the state bodies are adequate to control the situation and there is no need for federal regulation.

Logging Electrically 48
By R. E. GRAY

Until seven years ago when the Snoqualmie Falls Lumber Company commenced to experiment with electrically driven logging machinery, electric logging was unheard of. Now after the pioneering work done by this company, the practicability of this application has been demonstrated and four large operators are using electricity in the woods.

Factors Entering into the Cost of Electrical Energy 52
By LESTER S. READY

Starting with the generation of electricity Mr. Ready makes an exhaustive study of the factors entering into its cost. He answers the question raised by the public regarding the difference in the cost of energy between large and small consumers.

Discussion 41
Central Station Construction, Operation and Maintenance 58
Ideas for the Contractor 62
Better Merchandising 64
News of the Industry 66
Book Reviews 72
Meetings 73
Personals 74
Trade Notes 76

McGRAW-HILL COMPANY OF CALIFORNIA — 883 Mission St. — SAN FRANCISCO
Northwest Office: 1206 Spalding Building, Portland, Ore.
Publishers of JOURNAL OF ELECTRICITY

JAMES H. McGRAW, President — C. T. HUTCHINSON, Vice-Pres. & Gen. Mgr. — C. M. LINDSAY, Vice-Pres. & Treas.

WASHINGTON, Colorado Building
CHICAGO, 7 South Dearborn Street
PHILADELPHIA, Real Estate Trust Building
CLEVELAND, Leader-News Building
ST. LOUIS, Star Building
NEW YORK, Tenth Ave. at 36th St.

Subscription rates in United States, Canada, Mexico, Porto Rico, U. S. Possessions, Argentina, Bolivia, Brazil, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, Nicaragua, Panama, Guatemala, Paraguay, Peru, Honduras, Salvador, Uruguay, and Spain, $2.00 per year, 2 years $3.00. Elsewhere $3.00 Gold (13 Shillings). Single copy, 25c. When change of address is required, both old and new addresses must be given. Notice must be received two weeks before change takes place.

Copyright, 1925
By McGraw-Hill Company of California

Entered as second-class matter Feb. 17, 1921, at the Post Office at San Francisco, California, under Act of March 3, 1879.

Member Audit Bureau of Circulation

Printed in U. S. A.

McGRAW-HILL CO., Inc., New York
Publishers of
American Machinist—European Edition (*Published in London*)
Industrial Engineer (*Published in Chicago*)
Electrical Merchandising
Chemical and Metallurgical Engineering
American Machinist — Ingenieria Internacional
Electrical World — Electric Railway Journal
Engineering and Mining Journal-Press
Bus Transportation — Engineering News-Record
Coal Age — Radio Retailing — Power

Making Use of the Journal's Statistical Department

THROUGH its contact with the industry for many years and through its compilation of data and statistics regarding the growth and development of the power companies the Journal of Electricity has in its files an immense fund of information that is always available to its subscribers. This information includes everything from the kilowatt-hour generation of western companies to the names and addresses of western distributors of various electrical products.

Our subscribers constantly make use of this information as the following extracts from letters will show:

"I have been asked to deliver an address . . . . on the relation of electricity to the mining industry. I will appreciate any information you can give me from the stories compiled by you related to this subject which will be of assistance in the preparation of this talk."

And another letter:

"An argument has recently arisen between a friend and myself, he contending that transmission line costs (3-phase, 110-kv.) average nearly $50,000 per mile and I believing the figure nearer $5,000 (everything included, right-of-way, etc.) As readers of your journal we feel that you might be able to give us some figures approximately correct for the Pacific Coast."

These are only two of the many recent letters of this character which have come to our office. We feel that our readers can make wider use of the data which has been compiled by us than they are doing at the present time. The editors willingly will attempt to answer all queries of this character which are put to them.

Contractors much prefer a Loom that will fish easily and cut cleanly. That's why they specify

DURADUCT

DURACORD

solves the portable cord problem by keeping electric tools on the job. Its heavy woven cover protects the cord from injury.

TUBULAR WOVEN FABRIC CO.

PAWTUCKET, R. I.

Pacific Coast Representatives

Allied Industries, Inc.

San Francisco	Seattle	Los Angeles	Portland, Ore.
455 Second St.'	532 First Ave. So.	1256 Factory Place	53 Fourth St.

EDITORIAL

Governor Pinchot of Pennsylvania Criticizes the Power Companies

GOVERNOR Gifford Pinchot of Pennsylvania apparently disagrees with most authorities regarding "giant power," superpower, electric rates and state and federal regulation of electric utilities. In a recent address before the Commonwealth Club of San Francisco, the chief executive of the Keystone State expressed the opinion that control of the electric monopoly is the most pressing economic question before the people of the United States today.

In support of his contention that state regulation was a partial failure and would fail even more dismally unless supported by federal regulation, Governor Pinchot cited the experiences of his own state. He pointed out that regulation in Pennsylvania is inadequate because 94 per cent of the farms in that state do not receive electric service. Again rates are discriminatory because the Philadelphia Rapid Transit Company, one of the largest consumers of energy in the state, paid 8.3 mills per kw-hr. while the average price paid by domestic consumers was 74 mills (7.4 cents) per kw-hr. Lastly he points out that the Pennsylvania Public Service Commission has no authority to regulate security issues by public service companies. The Governor based most of his exceptions upon statements made by Secretary of Commerce Hoover in an address before the N.E.L.A. convention.

In the main, the answers to Governor Pinchot's statements will be found in Secretary Hoover's speech, which is printed on another page of this issue. However, some of the points he raises need further rebuttal. His statements regarding rural service do not apply in the West. In California more than 60 per cent of the farms are electrified and many of the other Western states are not far behind this record. Surely state regulation has proved adequate in this respect. He should study the efforts which are being made by the National Committee on the Relation of Electricity to Agriculture before he criticizes the utilities for failure to serve the farmer.

In answer to his statements regarding rates, we recommend to him an article by Lester Ready, chief engineer of the California State Railroad Commission, also printed on another page of this issue. In his article Mr. Ready carefully points out the many reasons why the small consumer must pay more for his energy that the one who uses ten thousand times as much.

Financing as far as the light and power utilities are concerned need cause Governor Pinchot little worry. In the majority of states security issues are subject to carefull scrutiny by state commissions. In addition to this the utilities cannot afford to allow the least cloud of suspicion to shadow their financial operations because of the almost universal practice of taking the public into partnership through the sale of securities. The four and a half million owners of securities in the public utilities of the nation are an asset that the utilities zealously guard.

On the whole Governor Pinchot's arguments do not appear to be well founded. At least it appears that he is wasting his breath when he makes such criticisms of the electric utilities in a section of the country where the great majority of farms are electrified, where average rates are cheaper than in any other part of the nation, where customer-ownership had its inception and has made its greatest strides and where the greatest interconnected transmission system in the world is operating successfully despite state boundaries and lack of federal laws.

A $5,000,000 Sales Program

DETAILS of the largest sales program ever announced by a Western utility were reported in the last issue of the Journal of Electricity. The Pacific Gas and Electric Company, in cooperation with other utilities in northern California and with manufacturers, jobbers, retailers and contractor-dealers, proposes to add 150,000 hp. in connected load to its lines during the next six months. Only a careful study of this announcement will bring out its full significance.

There will be more than 200,000 kva. of installed generator capacity come on the lines in northern California during this half of the present year. This is the inspiration for what has been designated as the $5,000,000 campaign instituted by the central stations. Every load-building appliance will be sold, from ranges to lamps, and the story of the blessings of electrical service will be carried to every home and farm in the state.

From the angle of its effect upon the electrical trade, this situation is unique. More than 250 sales engineers will make the canvas of the territory, thus creating a great reservoir of good-will for electrical appliances. Into this the retailer and the contractor may dip at will, to his own profit. It is generally considered that from ten to twenty calls per sale for house-to-house canvasing are required. This leaves from nine to nineteen prospects partly sold on the electrical idea, at the disposal of the local trade, like

ripe fruit, still on the tree but ready to fall into the basket with a little shaking.

Another interesting phase of the policy to be pursued by the central stations is that all installation work is to be done by contractors, thus placing literally hundreds of thousands of dollars in new work right in the lap of that branch of the electrical industry.

Truly, while the fact that a $5,000,000 sales program is in itself a staggering proposal for work of this kind, even in a land that has grown accustomed to dealing with superlatives in things electrical, yet, what seems to us even bigger is the sound policy that is back of the project. In a word, it consists in taking the established channels of trade into partnership on the deal, and working it out through the California Electrical Bureau, the state Association of Electragists, the jobbing, retail and other interests backed by all the power at the command of the central stations themselves. A bigger and brighter era dawns for the electrical industry in California.

Portland City Club Report on Columbia River

A TRULY illuminating report on "The Columbia River as a Waterway" has been issued by the City Club of Portland, and is reviewed in another section of this issue. The report, which discusses exhaustively the three uses to which the river can be put—navigation, irrigation and power development—will be recognized by engineers, government officials and others having an interest in the economic possibilities of the river as a distinct contribution to the available literature on the subject.

The Portland City Club, be it known, is one of the more serious-purposed of the civic clubs of the Oregon metropolis; its principal activity is to take up through committees the study of various local questions of timely interest, and to reach conclusions through reports based on such study. In the present instance, while the subject has a very definite local aspect, it is treated in a broad way, and because of the length and size of the river and the extent of the great basin drained by it and its tributaries the report will have an interstate if not a national significance.

Because of the stand taken against government ownership and operation of power plants, the report has been made the subject of some editorial controversy in the Northwest. Criticism has emanated principally from that group of Oregon citizens and newspapers that has been advocating development by the government of the Umatilla Rapids irrigation project with power development as a side issue, and seems to have been actuated specifically by the report's endorsement of the Priest Rapids project as coinciding with the principles embodied in its conclusions, while all mention of the Umatilla Rapids project was omitted. Incidentally, the Umatilla Rapids project has been declared by Elwood Mead, director-general of the Reclamation Service, as being "not feasible under present conditions, * * * and that it must await the growth of much more extensive opportunities for the utilization of its output (of electrical energy) than exists at the present time." What has been advocated by Dr. Mead as a condition upon which a specific project should be contingent is advocated by the City Club report as a general principle to govern all such projects on the river.

Without attempting to enter further into the merits of this controversy, we aver that there is a deal of straight thinking and sound logic in the conclusions of the City Club report, and that the data presented, on which are based these conclusions, make the report a valuable contribution to the technical literature about the Columbia River and the territory contiguous to it.

Utility Service and the Santa Barbara Earthquake

THE spirit of public service as exemplified by the light and power industry today was ably demonstrated at the time of the recent earthquake in Santa Barbara, once through the personal act of an employee and again when the facilities of an entire company were placed at the disposal of the stricken city.

In times of great danger or excitement most humans are actuated by an impulse of self-preservation. At the time of the earthquake, N. E. Engle, operator on duty at the Santa Barbara substation of the Southern California Edison Company, thought not of himself, but of the lives and safety of the many people in the city served by his company. Partly stunned from falling mortar, his first thought was of broken wires, short circuits and damage by fire or loss of life. He remained in the wrecked substation long enough to open the circuit breakers and completely de-energize the lines in the city. So has the spirit of service seen inculcated into the very lives of public utility employees.

Then again, within a very few hours after the shock occurred, hundreds of Edison employees, with fire trucks, tools and machinery were on hand to clear away the wreckage and once more establish service. By nightfall, street lights were burning in the area of greatest damage. Street car service was restored shortly thereafter. Work was well under way on the construction of a new substation to serve the city in place of the old one which had been wrecked.

Thoughtful and unselfish acts of this nature are the kind which proclaim to the public the fact that true service is the keynote of the electric light and power industry and its employees.

Accident Prevention Presents Challenge

CURIOSITY or thoughtlessness has led many a child to painful injury or an untimely death through contact with electric transmission or distribution lines. Scarcely a day passes that does not bring word of a new case. In addition to the needless sacrifice of youthful human life is the property and service damage suffered by the utility company upon whose lines the accident occurs.

Ample reason there is, therefore, for the serious consideration of further preventive measures. Steps have been eliminated from the lower extremities of most wood poles on distribution lines and from all poles on transmission lines of the higher voltages; danger signs have been placed (and serve well as targets for both malicious and brainless vandals); high-tension tower lines are located in comparatively inaccessible places; and other conscientious efforts have been made to eliminate the hazards of persons coming into contact with conductors. Nevertheless, this type of accident continues and shows an alarming percentage involving minors.

A program of education along adequate lines is obviously the most effective way to combat the thoughtless tendencies of youth. The logical place to reach this class is in the school. Wide-awake school authorities doubtlessly would fully cooperate with power-company representatives in a compaign of education among pupils. Not a "bugaboo" program nor a program entirely of "dont's," but one of simple and vital information would be the most effective.

Children admittedly are impressionable. Even the youngest in attendance at the public schools would not fail to recognize the intent of a colorful poster depicting the disastrous results of an electrical accident. For the older children and the high-school students an occasional talk by a qualified person to supplement bulletin-board posters would serve well.

Whatever the details might be, the existing situation presents a challenge.

Tracy E. Bibbins in Memoriam

IN the passing of Tracy E. Bibbins, the electrical industry of the West has lost one of the pillars upon which it was founded. Of the very brawn and sinew of the pioneers, Mr. Bibbins was born in San Francisco, educated in the public schools, and at an early age was compelled by the vicissitudes of the family fortunes to go out into the world on his own initiative and hustle for a living.

In spite of a situation that would have daunted most youngsters, he went to work with a vigor and determination that has characterized him ever since. He dug post holes; he would tackle anything, and the year 1889 found him building electric railways in Oregon. From then on, his advance was rapid. Promotion followed promotion, and each successive job found him ready for greater and greater responsibilities.

He was fortunate in his early environment. Coming of a long line of cultured, scholarly people, his mental processes were orderly, thorough, and sound, so the lack of a formal education as it is called today did not militate against Mr. Bibbins making of himself a gentleman of education and refinement, hiding under a certain reticence a warm feeling of human kindness for those with whom he came in contact.

Materially, as the world judges such things, he was a successful man. But more than that was the fine spirit of loyalty that he engendered in those who served under him, a consequence of the force of example that he set to his associates. In this lies the best monument that could be erected to his memory.

DISCUSSION

The Hen or the Egg?

To the Editor:

Sir: It isn't heard very much any more, that old argument as to which will survive, gas or electricity, Both seem to be healthy and have good prospects of survival for some years to come. But it does not take a long memory to recall those early days when the infant electricity loomed as a child that would do its predecessor out of its job, much as every mechanical development in the world has loomed as a dire threat to take the place of mankind and eliminate it.

The situation is repeated in every phase of human activity, though, and will continue as long as inventive or creative minds launch new departures from established ways. One viewed with alarm the advent of the movies, for they were to destroy the speaking stage. The speaking stage has survived exceptionallly well and has learned much from its younger rival, particularly as to its own limitations. It has sought to develop along lines entirely its own, as a consequence of competition, and now does things no movie can do.

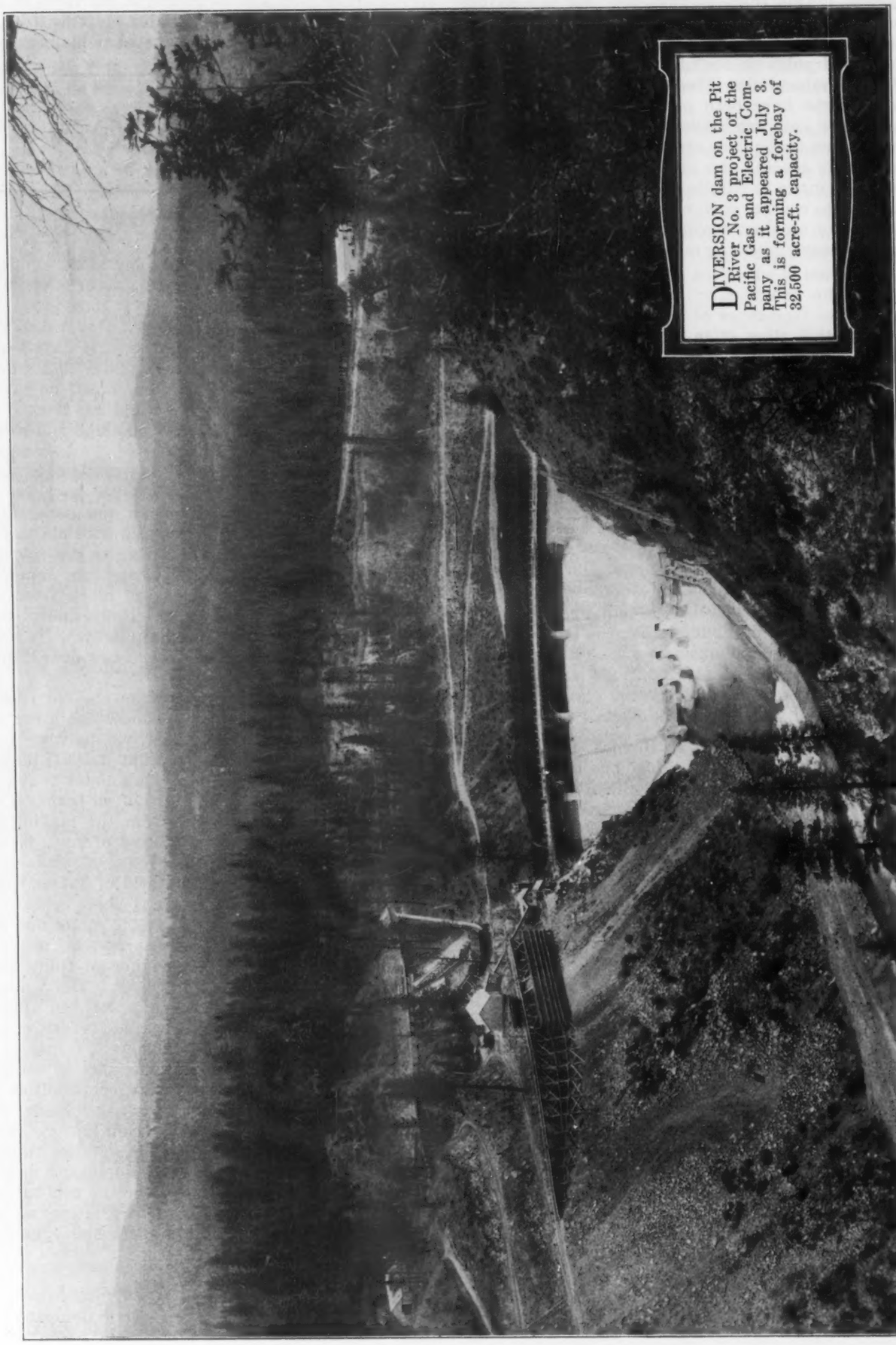
The same has been true between the old rivals, electricity and gas. The gas business has given up what it could do only second best, viz. lighting, and has concentrated its efforts on what it could do exceptionally well—heating. One finds today that gas heat enters into the manufacture of all manners of units of electrical equipment, from the making of millions of light bulbs to the casting of large pieces of machinery. And on the other hand, one finds that electricity has just entered the field of gas-making, not merely as a by-product of gas plant operation, but to play the gas-maker itself, or to meter and record the production of the gas-making machines.

Nothing really supplants altogether anything that is established, at least not for long. The wildest dreams of inventors that such and such an apparatus or idea will junk all that has come before, never have been realized to the fullest extent. Just as a community seems to benefit by the fact of competition between the vendors of the commodities it needs, so with mechancial advancement. Each new feature comes, stirs up the old to new activity, and then in the succeeding seasons finds its legitimate place in society and the pond becomes smooth again.

It is hardly worth bothering over the problem of which was the first, the hen or the egg, so long as we have both—hens for Sunday dinners and eggs for breakfast.

W. A. Cyr,
San Diego Consolidated
Gas & Electric Company

San Diego, Calif.



DIVERSION dam on the Pit River No. 3 project of the Pacific Gas and Electric Company as it appeared July 3. This is forming a forebay of 32,500 acre-ft. capacity.

State Versus Federal Regulation

By Herbert C. Hoover*

Secretary of Commerce

WE are in the midst of a great transformation in the development of electrical power—it amounts almost to an industrial revolution, for it bears upon its wings the most profound advance of American industry in a generation. It is reducing the burden of human toil, it is increasing productivity, it is bringing increased comfort to our people—and it has raised some new questions in relation to governmental regulation. Among these are proposals to impose federal over state regulation of the electrical utilities.

I have been requested by your managers to speak before this great body of men engaged in this industry upon these public relations and I therefore propose to shortly review the great transformation in progress in order to better illuminate the working of the present safeguards to public interest and the shifts needed to meet new conditions. And I wish your indulgence for a few remarks "upon the responsibility of the industry to the public."

I do not propose to refer to this evolution as either "superpower" or "giant power." Both these terms are blamed with connoting something that is not existent in power production. "Super" power has been envisaged as some overwhelming sinister encroachment into public rights. "Giant" power has been interpreted by extremists to be like any giant hitherto known, as having its only realism as a bogey or as entertainment for children or as a side show for the political circus. The practical everyday fact is that all this development is simply a centralization of power houses and interconnection of distribution systems. We had better stick to our engineering terms to describe what the thing really is—central generation and interconnection of distribution systems. If anybody can find evil or humor or poetry in these terms, he will need to be ingenious.

HERBERT C. HOOVER

who is convinced that the best interests of the public are served when the ownership, control and regulation of electric utilities are within the districts of operation. In Secretary Hoover's opinion the state bodies are adequate to control the situation and there is no need for federal regulation

I scarcely need repeat that all this great evolution starts from the scientific discovery of long distance power transmission. From it have sprung a long train of consequences truly startling in their effect.

It has made possible great economies in steam generation through huge central units; it has made possible the wide diffusion of the great water powers. Central generating plants bring great savings of capital investment through decrease in amount of reserve adjuncts to a multitude of individual plants, and an increased use of generator capacity by combining the high night load for town lighting with the day load of industry and generally a wider diversification of use. Beyond this, by interconnection between different regions even greater security and better load factors are secured. Water power resources are expanded for it is now posible to harness the flood flow of streams and to substitute it for steam power during the high water season. All this means not only cheaper operation but greater security of supply and enormous expansion in the application of electricity to much wider purposes.

Thus the lines of our power systems cross rivers and deserts, traverse fertile valleys and wooded hills and climb the passes in high mountains. They enable you to bear the burden of the great white ways by night and of the coal mines by day—they yield to you the rainfall of the North when drought has parched the South. You deliver your energy with the same delicacy of feeling to the dentist's hammer and the boiler maker, and you relieve a lot of human sweat. Our people now substitute for muscle an average of 3,300 kw-hr. per year per family instead of 250 kw-hr. but ten years ago—although they mostly do not know what a kilowatt-hour is, but they know what it can do.

Generation and Interconnection

We are well along the road in this evolution to central generation and interconnection. It is moving silently but stupendously before our very eyes. It is probably one-third complete. It is marked by movement in four directions. The first is the erection of highly efficient central generating stations of enormous size; second, the consolidation of town plants to form district power systems, supplied from these central stations; third, the interconnection of district systems for the transfer of power between them to balance demands of one system as against the other; and fourth, transmitted power is rapidly replacing individual steam engines and local electric generators.

At the beginning of this young century the greatest generation of power under one roof was less than 10,000 hp. Today we talk complacently about the

* An address delivered before the 43th convention of the National Electric Light Association, San Francisco, June 17, 1925

extension of a certain plant to 1,000,000 hp. radiating from one building. And that particular infant weighed only 750 hp. when it was born thirty-seven years ago.

Twenty-five years ago we had but one station exceeding 5,000 hp. Today we have at least 500 stations of over 100,000 hp. Central generation has made possible the big single generator, and today a single machine of 100,000 hp. is in construction. In the last five years only we have increased the total central station capacity from 13,000,000 hp. to nearly 20,000,000 hp.—almost 58 per cent. Of the increase, hydroelectric shows a rise from 8,000,000 to 9,000,000 hp. The central stations now produce more power than all the steam engines and other power produced in the country combined, outside of transportation. During the last five years the power generated at the factory and shop has actually diminished. The volume of purchased power has increased from 31 per cent to 40 per cent in this period.

It is only natural. The ability to secure power for instant delivery and for the actual moments in which it is used instead of maintaining boilers under steam for all hours, together with the far greater fuel efficiency of the central plants, are causes enough. The best central plants are today consuming only 1½ lb. of coal as against 10 or 12 lb. per kw-hr. of effective power in the little plants. In central steam plants we have in the last five years alone seen a reduction of coal consumed per kw-hr. from 3.26 lb. to 2.2 lb., or a saving of over 19,000,000 tons.

Concurrent with the expansion of central generation has been the evolution of the power district as distinguished from the individual town system. The outlines of these regional power districts have emerged in probably 50 per cent of the important power consuming areas of the country.

The wider interconnection between these regional systems also is proceeding apace. For this again makes use of the power capacity below the peak load by an interstate diversification. Such a flow of electricity will soon be traceable through the many regional systems continuously from Montana west to the Pacific, thence south to Mexico—a total of 1,800 miles. Shortly, power tie-ins will be completed in the Middle West and Southeastern areas, coursing all the way from Wisconsin and Michigan around through West Virginia and North Carolina to Arkansas and Louisiana. Incidentally, we have evolved a new profession—the power dispatcher, who determines which plants shall generate and at what times, hour by hour.

And it is not amiss to say something of the probable future expansion. A still larger amount of the horsepower produced in local factories will be displaced by purchase from central stations. We are just entering the stage of electrification of transportation. Present users will increase their requirements, new uses will be discovered. The power district as distinguished from the town system is making possible the expansion of service to the farms. At our present rate of increased requirements, by 1930 central stations for the country will probably need an additional capacity of fully 30 per cent carrying them up to nearly 36,000,000 hp. Probably $5,000,000,000 of additional investment will be required.

The most of this increase will be supplied by steam generation. The public is generally under some illusion as to our water power resources. In the districts east of the Mississippi, where 75 per cent of our power of all kinds is generated today, if every drop of water that is economically useful were actually harnessed, these projects could supply less than 15 per cent of the requirements.

The Public Interest

There is some anxiety in the public mind as to whether public interest is or will be adequately protected in this great transformation. We must face the fact that in order for these economies to be brought about, the power industry evolves from a single town enterprise to large district enterprises. These fundamental changes have necessitated the raising of vast sums—now nearly $1,000,000,000 per annum. The technology of central generation and interconnection, requires that the business must grow in the size of capital necessary for great power houses and district systems if we would have the benefits of low price power. We cannot buy 100,000-hp. generators at a 10-cent store. It implies vast consolidations, and a large number of intricate cross contracts, enormous commercial transactions and great security issues.

That the public has a definite right and interest in these transactions is no longer a matter of dispute. We have throughout the nation, by the 48 states acting independently, definitely abandoned the notion of compelling competition in electrical service as a method of holding down rates and holding up service. The states have in effect conferred definite territorial monopolies in order to avoid the fabulous duplication of equipment, investment, financial instability, operating expenses and cost to consumer that would be required to maintain competition to every householder and every factory. And when we deliberately clothe an industry with the habiliments of a monopoly, neither the industry nor the public any longer disputes the necessity of full control of rates, profits, service and finance by governmental regulation.

The real issue in this question is whether states, through their regulative powers, are already in control of the situation for the public interest.

The anxiety in the public mind over these charges is inherited from the bitter chapter of exploitation when the railroads went through a similar era of expansion, consolidation, and interconnection. No one can review that period of wild finance, plunder and corruption in transportation with any feeling of national pride or satisfaction. Things were done that never should have been done, and in reaction the public forced legislation which stifled development of American railways for years, and in the end imposed penalties in the way of inadequate facilities upon the people themselves. The railways came under regulation subsequent to their great era of trans-

formation and exploitation. Thus there is a very positive difference in the stage setting in this transformation of the electrical industry as compared with that which took place in transportation a generation ago. The electrical utilities have been under regulation practically from the day they were born and they are under regulation through practically the whole country today. Moreover, not only is public opinion far more alert because of its memories, but due to the local and regional character of the electrical industry its essential economies are comprehended much better by the public and can be dealt with locally and with full understanding, which is not possible in the vast railway systems whose interests were spread over great numbers of states instead of local communities. Beyond this the majority of the men who dominate and control the electrical utilities themselves belong to a new school of public understanding as to the responsibilities of big business to the people. The industry does not resent constant inquiry and constant public concern for public interest. Glass pockets are the safety of the industry as well as the public.

The Effectiveness of State Regulation

During the past year the Department of Commerce has been engaged upon a study into the effectiveness and the results of state regulation of the industry. Few people seem to realize the fullness, the extent and the authority of the regulation now in effect. It is scarcely necessary for me to say that there is either state or municipal regulation of the rates of electrical utilities in all but two of the states and of service in all but five of the states. The financial operations of such utilities are supervised and controlled in a large majority of the states. These principles are being rapidly extended over the few remaining states.

No one can survey the work of the state commissions and the instructive series of court decisions concerning their rulings as a whole without realizing that we are gradually developing a science of regulation and of understanding on one hand of the means of drawing the fine line between minimum rates to the people and on the other hand of such a reasonable profit to the industry as will stimulate its advancement. It is my belief from this investigation that the public service commissions with very little just criticism are proving themselves fully adequate to control the situation. The laws as written in the state statute books are sufficient to protect both the public and the industry, the two parties to the utility contract.

But the test of regulation does not lie in the statutes. To know whether regulation has really worked to public interest we must examine its actual results. We have now behind us a score of years of regulation and we can judge by real experience whether this method will protect public interest.

It seems to me that there are two final tests of this question. The first is: Is the service adequate and is the industry progressive in its provision for future need? The second is: Are the rates reasonable in themselves and are the profits taken by the industry upon the capital invested extortionate?

I need add nothing to what I have stated already as to the development of the industry to demonstrate that the advancement of the art and its progress in application are moving apace. In the national sense the industry is acquitting itself well in service. Its initiative in scientific investigation, in application of discovery, its extension of service, is of the highest order of American business. The service leads all others in the world and it improves every year.

As to the reasonableness of rates, it may be observed that the nation-wide average shows that rates are today slightly below pre-war, and this despite an increase of 100 per cent in wages, together with increased cost of fuel and of many supplies. Power is one of the few commodities which the public obtains at pre-war prices. While the price per kilowatt-hour has shown a small decline since before the war, yet beyond this the technical improvement in lamps has resulted in fourfold increase in the amount of light dispensed for the same money. Of perhaps broader significance in this test is the fact that the total interest and dividends paid by the industry in 1912 amounted to under 4 per cent on the estimated valuation of the industry; in 1917 it was under 5 per cent and in 1922 it was under 6 per cent and again about 6 per cent in 1924. It might be observed that the rate of taxation on private plants increased about 400 per cent, that is, from about 0.6 per cent on the estimated valuation in 1912 to 2 per cent in 1924.

It does seem to me that these facts demonstrate that in the nation-wide sense our state legislatures have been equal to their task of protecting the public and that the state commissions are doing their jobs well. And likewise, democracy is demonstrating its ability to retain mastership in its own house.

Federal Regulation

It has been proposed that as power districts may be no respectors of state lines, we must have federal regulation of power. I do not agree with the conclusion that federal regulation is necessary. I can see no reason for the imposition of a superior regulation, merely because Congress may have the power to exercise its authority under the commerce clause. The essence of regulation lies in a tight grip on the concern that actually deals with the consumer. There is the possibility that generating concerns may sell their power wholesale at the state line to distributing companies, thus attempting to make their wholesale prices exempt from the regulation of the consuming state. But that state still regulates the price and service of the distributing company. Most commissions exercise supervision of the contracts for purchase of power. The commissions are unlikely to accept blindly as an item of cost the amount paid to an external transmission company for its power, but rather they will examine the cost and reject it as a basic element if found unfair or excessive or collusive. I commend this view to the careful consideration of the state commissions. The utilities

themselves would do well not to oppose it. It would fill the only gap open for federal intervention. For the rest cooperation between commissions could settle the possible minor questions.

And there are the most weighty of reasons against federal regulation. Power is, by necessity, bound to be local in its districts—as to its service, its generation and distribution. It differs widely from the interstate implications of the railways where they are dependent not upon districts but upon whole groups of states. Local acquaintance, local valuation and public opinion can operate upon power to their fullest extent. Nothing will produce worse service than to attempt to transfer local problems to absentee solution at Washington. And if our democracy will stand at all it must stand upon the local responsibility. Nothing could be a more hideous extension of centralization in the federal government than to thus undermine the state utility commissions and state responsibilities.

New Problems in Public Relations

Central generation and interconnection do not in any way alter the essential character of regulation. There are, however, questions of public relationship which become of greater importance as a result of this transformation of industry, and I propose to review a few of them.

The most difficult of all questions before the commissions has been the determination of the basis and method of valuation of the properties for rate making purposes. There have been many theories and much discussion. But one element is common to all methods, and is the most important in the public interest; this is, that the rate of earning and consequent charge to consumers, is based upon reasonable return on actual value. The commissions, broadly speaking, have disassociated capitalization, as shown by stocks and bonds, from the valuation on which rates are to be based. The consumer is thus free from the burden of over-capitalization. The commissions have reached realities in the matter, casting aside all arguments based on watered stock. And through their control of security issues, they are in a position to prevent over-capitalization in the operating companies.

In most communities basic valuations have already been determined. It is greatly in the public interest that valuations be completed and made universal. By prompt commission action now we can avoid the forty years of delays and muddling we have gone through in the attempts to value the railways. And there is sound protection to the investor in this basis of rate making, for it holds capital issues to realities. It would be a further protection to the investor if all companies published to their stockholders the valuation of their properties by the public commissions.

Regulation of Municipally Owned Plants

The municipally owned plants in the country comprise about 3½ per cent of our total generating capacity. In approximately half of the states municipally owned plants are immune from state regulation of their rates and service. In many cases they neither maintain uniform accounting systems nor submit their accounts to state commissions.

It is vital to the local communities which have such plants that they should be able to judge the competency of their managers and the relative advantages of private versus municipal operation by comparison of results. Beyond this, however, as municipal ownership is much recommended to the nation by its advocates, it is of the highest importance that the whole nation should be able to form unbiased judgment in the matter by the parallels of actual experience. Whether the cities will secure their power and light from the great interconnected systems of private enterprise at regulated rates and profits, or will undertake to secure it by municipal ownership, will be settled only by experiment and the experiments are in progress. We make progress in democracy only by experiment. My point is not to argue the municipal ownership question which is often a problem of local factors but to emphasize the importance from a national point of view that the whole country should have available real knowledge of how these experiments result. Moreover, the best assurance to the citizen of those cities is the independent check on accounting service and finance by the state commissions.

We shall sooner or later have difficult questions to solve in connection with the relationship of by-product power from federal construction of dams for flood control, reclamation and navigation such as Muscle Shoals, the Colorado and St. Lawrence Rivers, and we should solve them solely on engineering principles.

Free Flow of Power Across State Boundaries

The free flow of power across state boundaries has become a question of importance because of the embargoes upon the export of hydroelectric power imposed by some states. There may possibly be cases in which the export of power from a state, if fixed for all time, might stifle its own progress. They are very unlikely. The free flow of power through economic districts is as vital to efficient national development as is free interstate transportation in the case of the railroads. These embargoes are of doubtful constitutionality, but of more importance it well may be doubted whether such policies will work out in the end for the interest of the originating state itself.

Advancement of Central Generation

Such actions are most unlikely to result in perpetuating more costly power to the originating state. The whole development of the industry indicates that the most economical use of water power must be in combination with large central steam plants, otherwise the secondary power cannot be developed nor can the full load of primary power be made useful. Thus a district pooling of production and distribution is necessary if hydro is to be cheaply developed and used. Beyond this, power will always retreat to the

shortest transmission for equal rates and hydro states will get their power when they need it.

A vastly important matter from a public point of view is that central generating stations and district distributing systems shall be erected upon the most soundly economic foundations for future service to the public. In this there should be immediate cooperation between the state utility commissions and the industry. The resources and the demand of every state and group of states should be subjected to critical study. The development of our streams on a designed program that will give the maximum ultimate power by equating the flow to the maximum degree is imperative. In skimming off the cream by haphazard development we may render full development an impossibility.

Again, location of central steam plants in their relation to fuel and water for cooling and to distance of transmission should be placed under analysis. I commend this to the commissions, the engineering professions, and to your association as an urgent opportunity for cooperation for our best development.

Obligations of the Industry

Public policy has not alone limited profits in the industry but it has given privileges and has, as a direct consequence of regulated rates, given protection to stable returns to the industry. There is therefore in this relationship a tangible obligation of rendering a wide-visioned service to the public in return. A great majority of the industry accepts this with the full sense of its importance.

The first obligation of the industry is service and in the light of these great inventions service now requires the full equipment of the country with central generation and interconnection. It is one of the greatest obligations ever imposed upon a single industry. Nor would the country be best served by pell mell haphazard treatment of the question.

The installation of these gigantic equipments for the least capital expenditure in such locations and in such fasions as will give the maximum efficiency not only today but in the long view, is vital. As I have said, I believe the industries should cooperate with the public utility commissions to study the long view of state and regional development. It all involves almost infinitely painstaking technical studies and development of actual construction step by step.

Industry now also must assume the burden of the development of service to territories beyond the congested districts. Such service upon efficient and low rate basis will bring long view returns of the greatest value to the industry and the community. Your association has already taken steps in promoting electrification of our farms and rural communities. It is desirable that the operating companies should take note of this development in California which already exceeds any other place in the world in this respect.

One phase of the whole question of ownership and control is being worked out through your distribution of prior lien stocks to your employees and consumers. With the increase in stockholders of this industry from 600,000 persons to 2,500,000 persons in five years, you are creating real popular ownership. I am convinced that in the long run the industry should be local, not only in its ownership but in full control within the district of its operation. It is a vital part of the community organism. This may be partly unattainable in the period when outside capital is required, but the ultimate safety of the industry and the public lies in this direction.

In closing I should like to repeat a statement which I recently made, for it bears upon this industry. I said:

"Perhaps dimly, but no less certainly, there is looming up in the American industrial world a definitely new relationship in the whole setting of industry. The capital ownership of great service and production is rapidly being diffused among millions of individuals. The ownership is thereby being divorced from management. The managers of older and settled industry are today rising out of the skill of the industry itself. And they are gradually coming into a new vision of their relationships. Those relationships have a tripartite responsibility; to the consumer on the one hand, to the worker on another, and a regard for capital only in the sense that it shall be assured security and this secured on the lowest terms in the market. Under this regime the savings we can make through application of invention, through increase in skill, through elimination of collective waste, are bound to be shared with the consumer to attract business, to be shared with labor to secure service and contentment, and to be decreasingly shared with capital, because capital comes cheaper with increasing security.

"If we examine our utilities and many of our older and larger manufacturing concerns from this point of view, we shall find that an astonishing proportion of our national production and service is now operating in various degrees under this regime of a new conception of capital, management, labor and the consumer. Thirty years ago we should not have believed this possible. Nor are these tendencies based upon any abandonment of self-interest as a motive. They are based on just a little more intelligent self-interest, with perhaps a little larger proportion of that salt of altruism found in the impulse to personal accomplishment and in responsibility to widespread numbers—and to public opinion.

"He would be a rash man who would state that we are entering finally the industrial millenium, but there is a great ray of hope that America is finding herself in the road to a solution of the greatest of all her problems; that is, a method by which social satisfaction is to be attained with the preservation of private industry, of initiative, and full development of the individual."

The electrical industries may through their methods of organization be the bearers of a new gift to sorely tried men, greater even than the energy they supply.

Logging Electrically

By R. E. Gray*

Electrical Engineer, Snoqualmie Falls Lumber Company, Snoqualmie Falls, Wash.

UNTIL seven years ago when the Snoqualmie Falls Lumber Company commenced to experiment with electrically driven logging machinery, it was impracticable if not impossible to log successfully using electricity for power. Now, after the pioneering work done by this company has demonstrated the practicability of this application of electricity, other operators have installed electric machinery and this new use of electric power in industry is increasing. In this article, Mr. Gray describes the early experiments made by his company and the complete electrification later of its entire logging operations.

ALONG the Pacific Slope, and in Idaho, Montana and British Columbia logging is a term as well understood as railroading or shipping. Under this general heading are included all of the activities connected with falling the trees in the forests, sawing them into suitable lengths and transporting them to the mills to be manufactured into lumber.

Insofar as the falling of the trees and cutting them into lengths is concerned practically the same methods are used by all loggers. This is hand work in which men working in pairs with axes and saws cut the trees down, after which one man saws them into lengths varying from 24 to 40 ft., according to the kind of timber cut and the facilities of the mill in which they are to be manufactured into lumber. From this time on in the process of getting the logs out to a railroad where they are loaded for shipment, power machinery is used. Space does not permit of a description of the many different methods nor of the different kinds of machines used in this process, nor is it necessary to the purpose of this article, which is to show that electricity can be used successfully for power. It will be necessary to acquaint the reader only with the general problem involved before proceeding to a description of an electric installation.

Development of Logging Methods

In the early days, the gathering of the logs, which is called yarding, to some vantage point for transporting them out of the woods, was done by horses or oxen. Then about thirty years ago the steam engine came into use. The first machines were small donkey engines equipped with a spool or nigger head around which a line was wrapped and fed on and off by hand when the log was pulled in or the empty line pulled out again. The empty line was pulled out by a horse. It has been a big step from this beginning to the modern logging machine capable of handling logs, weighing many tons, at a rate of nearly 1,000 ft. per minute and returning the empty line at 2,000 ft. per minute.

Modern logging machinery has been built up to its present efficiency using steam exclusively for power. Ordinarily the same manufacturer produces all the equipment including the engine, although it is not the opinion of the writer that this fact has retarded the use of electric motors in the woods for more than a few years at most. The extremely high comparative cost of the electrically driven machine and the lack of available power are perhaps the chief reasons that only in the last five years has electricity been used for power in the woods. It is true that only in two states, Washington and California, is there any use whatever of this motive power, and there only by the large operators. It is also true that electricity represents an insignificant percentage of all the power used in the logging industry of these states. However, the connected load of electric logging equipment now exceeds 10,000 kw., and this fact is significant when it is remembered that this load has been developed in the last five years.

The turning point toward electric drive came in 1920 with the termination of successful pioneering by the Snoqualmie Falls Lumber Company, Snoqualmie Falls, Wash. Electric logging, as it is called, is of such recent date that no great difference has been developed by the manufacturers in machines used for the same purpose, and due to the fact that at present all companies engaged in electric logging are using practically the same methods and machinery, it is possible to get a fair idea of the operation by a brief description of the methods and machines used by the Snoqualmie Falls Company.

Logging at Snoqualmie Falls

In 1918 this company had completed a lumber manufacturing plant consisting of two saw mills and a planing mill with a capacity of nearly 500,000 board feet per eight-hour shift. A tract of standing timber near the mills sufficient for at least thirty years' operation furnished the raw material for the plant. Two logging camps were established and equipped with steam driven machines, which were, as will be shown later, supplanted by electrically driven machines. The method of logging used is the well-known "high lead" system.

In this method two machines are used, one called a yarder to gather or haul the logs to a pile along-

* Paper read before the second annual general meeting of the Technical Section, Northwest Electric Light and Power Association, Spokane, April 16, 1925.

side of the railroad, and one called a loader used to pick the logs up from this point and load them on cars to be shipped out to the mill. A yarder and loader working together constitute what is known as a "side," and the size of the camp is designated by the number of "sides" in operation. A series of parallel railway spurs, extending through the timber about 1,000 ft. apart, lead out through a main spur to make-up tracks or sidings placed conveniently for assembling both the empty and loaded cars.

The yarder and loader are essentially hoisting machines. The yarder has three drums any one of which can be operated independently of the others. On the main drum is wound the main line used for pulling in the logs. This line, 1½ in. in diameter, is

"Thomas Edison," the first successful electric yarder which was put in service in 1918. The author, who was largely responsible for the electrification of the Snoqualmie company's logging operations, is in the foreground

standard plow steel hoisting rope with wire rope center having a maximum tensile strength of 166 tons, and a proper working load capacity of 33 tons. The second drum is called the haulback drum on which is wound a smaller line, ¾ to 1 in. in diameter, but of the same material as the main line. This line is used to pull the main line out again after a log has been hauled in. The third drum is used to carry a still smaller line, ⅜ in. in diameter, which is pulled out by hand and used to move the heavier lines as changes in working locations become necessary.

The loader consists of two hoisting machines with two cable drums each, either of which can be operated independently of the other. One drum on each hoist carries a line used to lift the log onto the cars. Of the two remaining drums on each machine, one carries a line used to pull empty cars into position for loading, and the other carries a small ⅜-in. line used mostly to hoist a man up the spar tree to make repairs and changes in the rigging.

Use of the Spar Tree in the "High Lead" System

The spar tree for "high lead" logging is simply a big tree left standing alongside of the railroad, trimmed and topped for use as a mast to support the rigging incidental to the yarder and loader. Sound fir trees, 175 to 225 ft. high and 6 to 10 ft. in diameter at the base, are selected for this purpose. Twelve guy cables of wire rope, six near the top and six about half way up, are placed to hold the tree against the pull of the lines. Two pulley blocks are fastened near the top of the tree below the upper guys. One, about 36 in. in diameter and weighing nearly two tons, is used to pass the main line through, and the other, a much smaller one, is used for the haulback. A third pulley block is then fastened to a stump just outside the area from which the logs are to be hauled.

The small ⅜-in. line on the third drum of the yarder is now pulled out by hand, threaded through this third pulley block, and carried back to the spar tree where it is used to pull the haulback line out and through this third block. The main line is then pulled up the tree, threaded through the large block, and brought back to the ground where it is fastened to the haulback line, making a continuous loop capable of being operated in either direction. A piece of slightly smaller line, 10 or 12 ft. in length with a heavy steel hook on the outer end, is fastened to the main line at the juncture of the main line and haulback, something like a leader on a fish hook. This is called a choker and is used to hitch the main line onto the log, which is done by passing it around the log and hooking it onto itself. The reason for running the lines up through the blocks high up on the spar tree is to keep the lines clear and also to raise slightly the front end of the oncoming log preventing it from digging into the ground and being caught on stumps.

From the practice of using a high spar tree this method has derived the name of the "high lead" system, and without a doubt it is the most productive method known of gathering logs where a railroad can be run in within yarding distance. Since experience has taught that it is not economical to use a "high lead" to yard over about 700 ft., it is necessary to locate the railroads about 1,000 ft. apart, and the spar trees 1,000 ft. apart along the railroads. This arrangement puts the spar tree with the logging machines in the center of an area 1,000 ft. square—500 ft. in each direction at right angles to the track, by 1,000 ft. parallel to the track. Since the yarder pulls in the logs from all directions it will be readily seen that the maximum distance the logs are yarded is about 700 ft. from the corners of the square. Where the lay of the land makes the cost of building a railroad in to a spar tree prohibitive, a yarder is pulled out from the nearest railroad, rigged up to a spar tree so as to yard the logs into a pile from which they are re-yarded on to the railroad for loading out. Such a spar tree is called a "swing tree," and reference will be made to one later.

The loading lines are threaded through pulley blocks called loading jacks, suspended about 20 ft. apart from the guy lines on the spar tree directly over and about 40 ft. above the track. Immense steel tongs, like ice tongs, are secured to the ends of the loading lines to grip the logs for raising them on to the cars. The cars used are essentially flat cars with a raised shoulder or bunk near either end on which the logs rest.

Experiments with Electric Machinery

It may be said that a lumber manufacturer can have all the fuel needed to generate power for the operation of his plant for the cost of transporting it from the mill to the boiler room. This chance to

economize led to the experiment with an electrically driven yarder. The move was made purely for economy and no idea of any more than equaling the performance of the steam driven machines was entertained. One of these machines was tried out in 1918 and 1919 surpassing the output of the 11 x 13-in. steam yarders, and in fact almost equaling that of the 12 x 14-in., the largest steam yarders. This showing gave impetus to the trial and, since a complete "side" includes both a yarder and loader, an electric loader was procured in 1920 and put to work with the yarder. These machines were operated and observed for a few months and formed the basis of the specifications for the machines now in operation.

A survey was made of the generating capacity of the power plant, and it was found to be sufficient to electrify the entire woods operation, although later additions in the mills made it necessary since to tie in with the Puget Sound Power & Light Company. With power available, and in the light of the experience gained in the experiment, it was decided to proceed with the electrification of the woods, and seven yarders and six loaders were purchasecd.

Distribution and Control Equipment

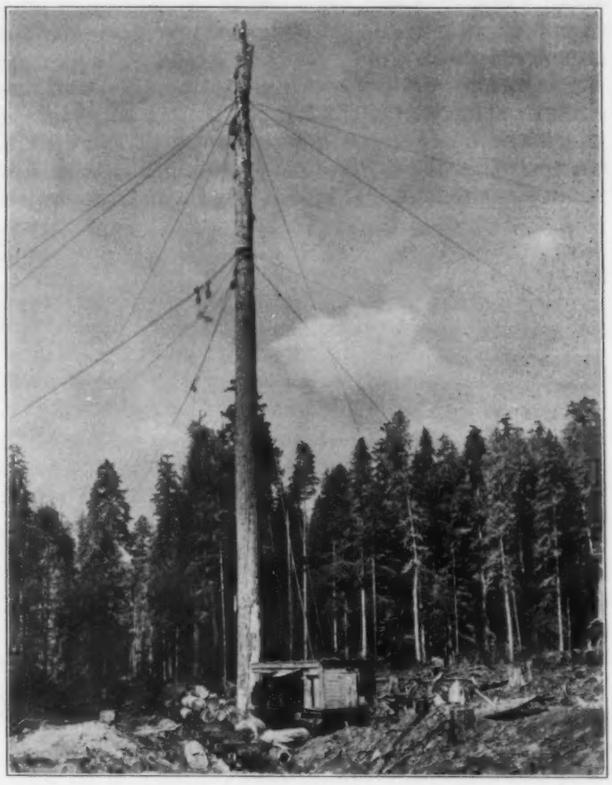
Three single phase, 833-kva., 22,000/600-volt, 60-cycle, oil cooled, outdoor transformers, with 5 and 10 per cent taps on the low voltage side, are used to step the generation voltage of 600 up to the distribution voltage of 22,000. Eight 450-kva., three-phase, 60-cycle, oil cooled, outdoor transformers, 22,000/600 volts, with 2½, 5, 7½, and 10 per cent taps on the high voltage side are used in the woods to step the line voltage down to 600. These transformers are used one with each "side," and are mounted on sleds as they have to be moved about once a month. A 50-amp. triple pole, single throw, 22,000-volt, outdoor, fused disconnecting switch is mounted on the transformer sled to disconnect the transformer from the line, as are also suitable lightning arresters. These protective devices have proven wise provisions.

Five thousand feet of three conductor, No. 4/0 armored cable were purchased to connect the yarding and loading motors to the 450-kva. transformers. This cable is in 500 and 250-ft. lengths, as it is thought that 500 ft. is about as close as safety permits the high voltage line to be brought to the operation. Twenty-four 300-amp., single pole, single throw, disconnecting switches are installed for the purpose of sectionalizing the power line in the woods. The equipment without mounting cost nearly a quarter of a million dollars.

The Yarder

The yarder equipment consists of a three-phase, 60-cycle, 550-volt, 300-hp., slip ring motor with full magnetic control operated by a master switch. The maximum torque capacity of the motor is 425 per cent of its rating. The motor is equipped with a solenoid brake which drags when the controller is in the first position producing a creeping speed on the main line, which is necessary to give the men a chance to get out of the way when the choker is being tightened on the log. Incorporated in the control system is a current limiting device, the adjustment of which is such that the pull on the main line may be limited to any pull between 50,000 and 70,000 lb. Inverse time limit overload relays protect the motor from a locked rotor current condition.

In addition to the speed variation gained electrically, a gear change arrangement, operated by compressed air, produces a slow speed of 350 ft. per minute and a high speed of 800 ft. per minute on the main line. The speed of the haulback line is 2,000 ft. per minute, which is the rate of travel of the empty line going out for a log.



One of the electrically operated "sides" used by the Snoqualmie Falls Lumber Company. This is the first 2-speed unit ever built

The Loader and Its Control

The loader equipment consists of two, three-phase, 60-cycle, 550-volt, 75-hp., 12-pole, slip ring motors, also equipped with solenoid brakes and full magnetic control. The loaders, like the yarder, have a mechanical gear change producing a slow speed of 210 ft. and a high speed of 450 ft. per minute on the loading lines. The gear change is operated by air from two 52-cu. ft. air compressors, each driven by a 15-hp. motor, the same source as that supplying the yarder gear change. This air is maintained automatically at 125 lb. pressure.

Loading logs requires a wide range of speed on the loading lines, and as practically all speed variations when lowering the lines are obtained by a manipulation of the brakes, it will be necessary to describe the workings of the solenoid brakes somewhat in detail. The loader brakes consist of two sets of brake shoes operating on two brake drums

mounted on the motor shaft. The braking torque is applied and released through the operation of three solenoid coils which may be designated as "A," "B," and "C." Coils "A" and "B" operate one of the brakes while coil "C" operates the other. Coil "A" is connected between a collector ring of the rotor and the Y of the secondary resistance. Coils "B" and "C" are connected across the primary circuit.

Resistances are connected in series with each of the brake coils, these resistances being automatically cut out at different positions of the controller, thereby varying the current in the solenoid coils thus varying the braking torque. The brake operated by coils "A" and "B" is capable of a torque of 900 lb. at 1-ft. radius, which is 130 per cent of normal motor torque, while the brake operated by coil "C" is capable of 800 lb., or 120 per cent of normal motor torque. Thus a total of 250 per cent of normal motor torque is obtained, and since the motor works through a 17:1 ratio, this means that a fir log containing nearly 9,000 board feet and weighing 60,000 lb., can be held in the air by the brakes if necessary.

At each successive position of the controller a braking torque corresponding to a motor torque is produced. The following table shows these torques and also the size log that would be lowered slowly into place:

Controller Position	Per cent Braking Torque	Per cent Motor Torque	Size of fir log that would be lowered slowly	
off	250	0	Board ft.	Lb.
1	200	50	5,000	36,000
2	155	50	3,600	25,000
3	105	50	2,000	14,000
4	35	50	Line running free	
5	35	110	Line running free	
6	35	152	Line running free	
7	35	210	Line running free	
8	0	235	Line running free	
9	0	292	Line running free	

With the machine running in high gear the sizes of the logs would be one-half those given above.

When the controller is placed in the first position for hoisting, the motor torque slightly exceeds the braking torque making it possible to raise a light load slowly which is necessary when a man is pulled up to work on the rigging in the spar tree. From the second position on in the hoisting direction no brakes are applied, the resistance being cut out in the secondary circuit step by step in the manner customary in operating wound rotor motors. The lifting capacity of this loader is 28,000 lb. per line, or 56,000 lb. with both loading lines. This means that an 8,000-ft. fir log, weighing 28 tons, can be lifted.

Performance of Electrically Driven Machines

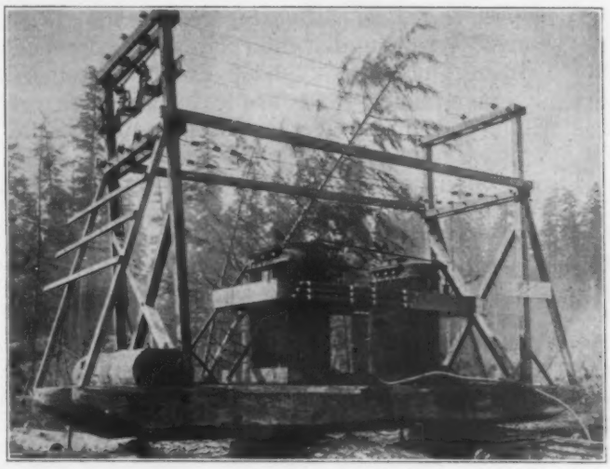
The first of the machines just described was received early in the summer of 1921. Three units consisting of a yarder and loader each, the two machines making a complete "side" mounted on one sled 60 ft. long, were assembled and put into operation in July, 1921, completely electrifying one of the camps. In 222 days these three units had yarded and loaded 65,000,000 ft. of timber off 1,000 acres, an average of 100,000 ft. per day per "side." This record would prove to any practical logger that the "electrics," as they have come to be called, are log getters, particularly when it is also stated that the timber was less than 50 per cent fir, the remainder being hemlock and cedar about evenly divided, with the average log containing a little less than 1,000 ft. The kw-hr. input per 1,000 ft. during this period was 9.23. The second camp was electrified in the spring of 1922, completing the first electrification to succeed in the woods.

The main power line, which will be eventually 20 miles in length, extends out at present five miles. Cedar poles, steel pins and steel pole tops with porcelain pin type insulators are used in the construction of this line. The temporary power lines built in the woods are strung on small standing trees, the trees being trimmed and topped with the cross arm fastened on by a patented chain device. From six to eight miles of temporary power lines are built and abandoned each year. The principal item of cost is labor, the material being salvaged and used again.

Operating Characteristics of the Load

A graphic wattmeter test taken during a period of one month with six "sides" and one "swing" operating with a total connected load of 2,800 kw., showed a maximum average input for one hour of from 1,000 to 1,100 kw., the minimum average input ranging from 650 to 925 kw. The average input for eight hours during the same period was 875 to 1,000 kw. Peaks of 2,800 kw. occurred about once a day; peaks of 2,400 kw. occurred from four to ten times a day; and peaks of 2,000 kw., from forty to one hundred times a day throughout the test. These peaks were momentary. The power factor was generally less than 60 per cent and rarely rose to 70 per cent, although with the load 1,500 kw. and over the load factor was always 60 to 75 per cent. The minimum kw-hr. input for any one day during the test was 7,000, the maximum being 8,050 kw-hr.

The operations at Snoqualmie Falls for the last five years have demonstrated beyond doubt that it is a physical possibility to carry on electric logging successfully, and the fact that four large operators have followed the example of the Snoqualmie Falls Lumber Company and electrified their logging operations would indicate that the economy of the practice is being accepted, and an entirely new use for electricity in industry has been found.



One of the first 22,000/600-volt transformer sleds used by the Snoqualmie Falls Lumber Company

Factors Entering into the Cost of Electrical Energy

By Lester S. Ready

Chief Engineer, Railroad Commission of the State of California

STARTING with the generation of power, Mr. Ready takes it through the various steps before it reaches the consumer and presents a clear picture of the costs that are incurred by the central station rendering the service. In developing the reasons for the cost per kilowatt-hour to the residential consumer, the author indicates the reasons for the difference in rates applicable to small and large users of electricity.

THE question, "Why should I as a purchaser of electricity to light my home or store pay from 5 to 8 cents per kw-hr. when the street railways and large power consumers buy electric energy for less than 1 cent and hydroelectric power at the plants is reported to cost less than ½ cent per kw-hr.?" is one that has caused many a utility man to scratch his head to find a convincing explanation.

Most of the public is familiar with the fact that the retail price of many commodities is 100 per cent in excess of the wholesale price. Those who have earned their living by farming have realized that the fruit eaten in the restaurant was charged for at a much higher price than was received for the fruit by the rancher. There always has been doubt of the justification for a price of 5 to 8 cents per kw-hr. for electric energy in the home when the company that buys it at the substation pays an average of 1 cent per kw-hr.

The wide variation in the price of electric energy is due mainly to difference in the cost of rendering the service of the hydroelectric utility which though great in size and representing millions of investment, is carrying on one of the most complete retail enterprises that exists and, at the same time is in the wholesale business to a greater extent than generally exists in other lines of business. Its business with respect to residence lighting represents one of the greatest retail credit enterprises in existence. One company has over 250,000 credit customers whose average monthly bills are less than $2.50, yet it is selling power to concerns where the individual bill is approximately $100,000 per month.

Many people spend more money in the 5, 10 and 15-cent store in a month than they pay for their electric service. They go to the 5, 10 and 15-cent store, crowd through the aisles, select their own purchases, wait for their change, and carry their purchases home. As compared with this, the electric utility delivers its service to each individual house. There it is ready on call, without delay. With the pressure of a button its service is at one's command. The consumer is freed from the inconvenience of carrying home from the store the commodity purchased, and the bill is presented at the end of the month after the service is used.

The power company is one concern that puts into practice the plan of "producer to consumer" that is heralded as the method of reducing the cost of living. It carries on all of the activities which in other lines of business are handled by numerous agencies. Were kilowatt-hours "shoes," a concern, to do the same work that the electric utility does, would have to include the cattle raiser on the great plains of the West; the railroads which haul the hides to the tanner; the tanner; the shoe manufacturer; the wholesale merchant; the railroads which haul the shoes to the various cities; the trucking firms which deliver the shoes to the retail merchant; the retail merchant, and, lastly, the parcel delivery company which delivers the shoes to the home after they have been ordered.

The potential kilowatt-hours in the reservoirs and canals of the company might be compared to the hide on the steer's back; the kilowatt-hours on the switchboard of the hydroelectric plant as the leather coming from the tannery and, finally, the kilowatt-hours used to light the home as the pair of shoes received at the door.

The amount of the requirements of individual consumers of the electric utility varies from 10 to 20 kw-hr. per month from the small resident lighting consumer to 1,500 to 2,000 kw-hr. per month for the average industrial and agricultural consumer, on up to the large railway and wholesale company which purchases from 10,000,000 to 20,000,000 kw-hr. per month.

It is probable that few have visualized such a wide variation in the amount of purchases in any other line of merchandise. The consumer who buys $1 worth per month and the consumer who buys $100,000 worth per month in most other lines of commodities are supplied by widely different concerns. In the utility field, however, the one who pays his $1 bill pays it to the same firm and deals with the same organization as the one who pays a $100,000 bill.

In order to visualize more easily the system of a hydroelectric company, Fig. 1 has been prepared setting forth the different parts of the electric system

from the hydroelectric plant in the mountains along the transmission line to the substation, the stream and its connection, the distribution substation, the distribution system serving the industrial as well as the residential consumer. In this diagram single hydroelectric plants are shown for simplicity, although in general a large number is connected to each system, together with several steam plants, substations and a network of transmission lines.

Fig. 2 shows in relief the state of California. On this are shown the location of the numerous power plants and extensive network of transmission lines of the larger utilities, also the location of hydro plants in the high Sierra and steam plants at the seashore. Fig. 3 is a typical distribution system from the substation of such companies.

Sources of Power

The hydroelectric utility, by the installation of dams, ditches and pipe lines, stores and diverts the water of the mountain streams along the sides of the canyons and through the generating plants transforms the potential energy represented by the water high above the stream bed of the river into electric energy. The hydroelectric plants are located in general, from 100 to 200 miles from the centers of population. As electric energy is not transportable as other commodities are, in freight cars on trains, long transmission lines from the power plants to the substation of the city must be constructed. This requires large additional investments and, for economy, the stepping up of the voltage to 100,000 to 200,000 volts at the power plant. At the main receiving substation the voltage must be stepped down to the distribution or secondary transmission voltage.

The streams of the California mountains do not run uniformly, and the years vary in precipitation to such an extent that the hydroelectric plants cannot be depended upon to make available a continuous full supply of power. Steam plants are constructed near the main centers of power load to guarantee against interruption of service should the long transmission lines fail and also to supply an amount of power during the dry months of the year when the hydro plants' output is reduced, and to guarantee against a curtailment of power when years of drought occur, such as the one just passed. The power companies are required to supply the load as demanded by each consumer, not as the utilities wish to supply. They must anticipate the demands to be made. There is no delaying of delivery to existing customers.

Fig. 4 shows the daily output in kilowatt-hours for one utility, analyzed for 1923.

The importance of steam stand-by plants is apparent at a glance, for 55 per cent of the power was obtained from this source during December, 1923, while in April over 80 per cent was produced by the hydro plants. In 1924, due to the extreme shortage of water supply, over 80 per cent of the supply of power was obtained from steam plants in September.

The hydroelectric and steam plants combined deliver to the main substations a dependable supply which is available for sale to the public. From these substations large quantities are purchased direct by street railroads; large industries, including cement plants, gold dredgers and the like; other electric utilities and municipalities which distribute electric energy to their own consumers. From these substations extensive networks of pole lines extend over the streets and roads carrying the electric energy to

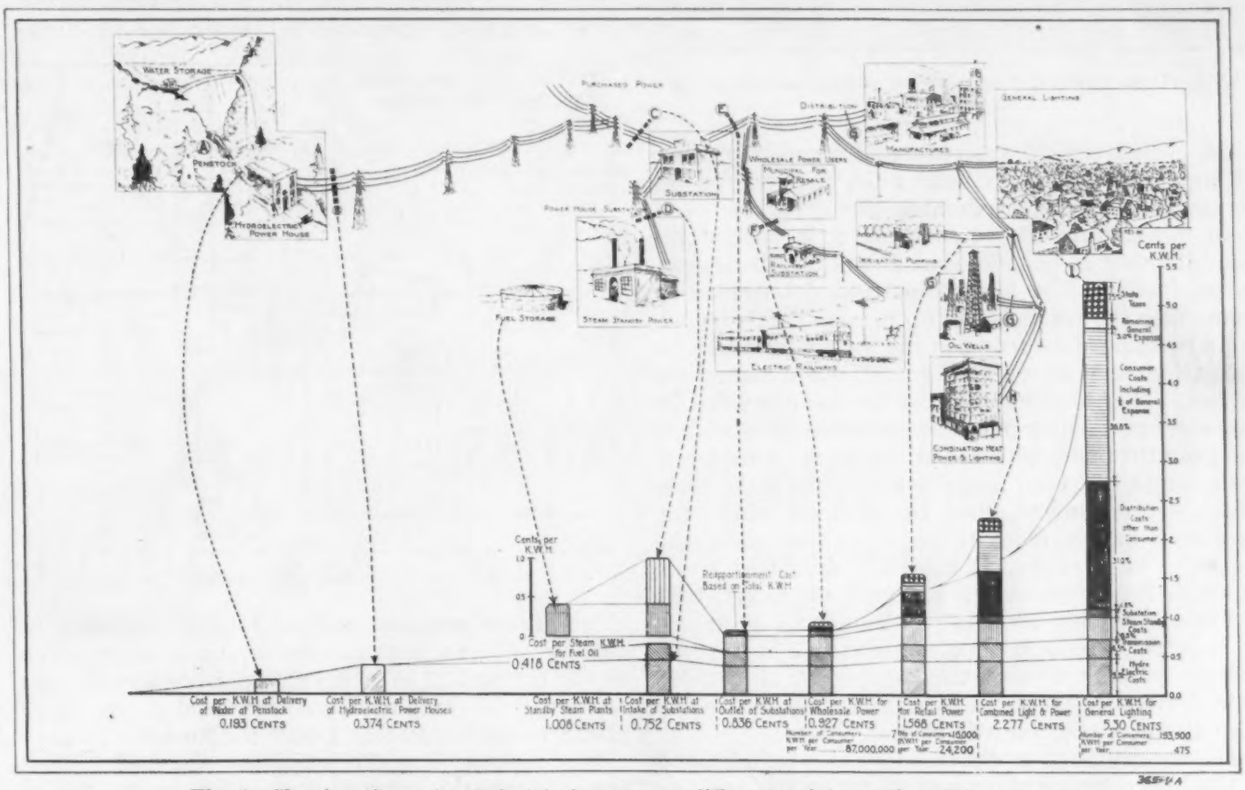


Fig. 1—Showing the costs of electrical energy at different points on the utility system

every consumer of the company. The energy is used on the farms to pump water for irrigation; by the industries for running their manufacturing machinery, and in the homes and stores for lighting and operating the various convenient appliances which have become so necessary in daily living.

The Cost of Electricity at Different Points

At the bottom of Fig. 1 is set forth in graphical form the average cost per kw-hr. of electric energy at different points on the system of one of the largest hydroelectric utilities in California for the year

Fig. 2—Topographical map showing interconnected systems in California

1923, which closely approximated an average year of water supply and a year when fuel oil for the steam plants cost approximately $1 per barrel.

In determining the cost of electric energy per kilowatt-hour at the different points on the system, as set forth in Fig. 1, cost has been determined by computing the total charge up to each point, including a reasonable return upon the money invested, depreciation and all operating and maintenance expenses. This total annual cost has been divided by the average number of kilowatt-hours produced in the year 1923 and delivered at the points considered. No attempt has been made to segregate those costs which are dependent upon the demand which the consumer makes from those dependent upon the length of time energy is used. It should be borne in mind, therefore, in the study of the chart, that average costs only are shown. The costs of service to users who require small amounts of energy, or energy for only a short time each day, or a short time during the year, in general would be greater than the averages for the classes shown.

The energy as it is delivered on the switchboard of the hydroelectric plant represents on the average a cost of less than 0.4 cents per kw-hr. This cost is made up mainly of interest on the investment in dams, canals and power houses. This power, however, is available only in the high mountains where little market exists. Further study of Fig. 4 entitled "Daily Total Output," shows that the hydroelectric output is far from continuous and uniform. On the system in question the water power available during the months of April and May totaled approximately 3,500,000 kw-hr. per day, while in December it had dropped to approximately 2,300,000 kw-hr. In 1924, an exceptionally dry year, the water power varied from 4,000,000 kw-hr. per day in April to 1,000,000 in September. Although the year was a relatively dry one, it is very apparent that this power would be of little value to the general power-using public if other sources were not available to make up the deficiency during the dry months and make possible delivery to the consumer of whatever power he needs upon demand.

The Cost at the Substation

Delivered at the substation from 100 to 200 miles from the hydroelectric plants, the cost of the hydro-produced power has increased to approximately 0.75 cents per kw-hr. Losses have occurred which increase the hydro portion of the cost of energy approximately 10 per cent. It takes energy to transmit or transport energy, just as it does other commodities. Added to the hydro cost is the cost of transmission, or one might say, freight. This is mainly interest, depreciation on and maintenance of the investment in transmission lines.

The steam plants for the average year are called upon to produce approximately 20 per cent to 30 per cent of the energy required. The fuel cost of the year analyzed represents 0.4 cents per kw-hr. of

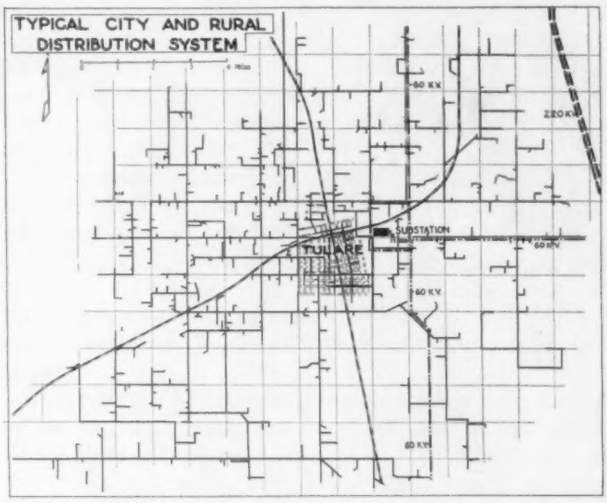


Fig. 3—A typical city and rural distribution system

steam power produced, and the total steam costs, including labor, maintenance, interest and depreciation on the investment in steam plants, increased the cost of energy delivered at the switchboard of the steam plants to approximately 1 cent per kw-hr.

The column (Fig. 1) indicating the cost of this energy from the substation shows that the cost is

made up of a portion representing the hydro cost, a portion representing transmission of the hydroelectric energy, a portion representing steam stand-by costs, and the balance representing the cost of handling the energy through the main substations. This total cost of approximately .84 cent for the year in question represents the average cost of energy delivered from the substations. It is made up of operating expenses of the plant, maintenance, depreciation and a return upon the money invested, the last being the largest single item because of the relatively large investment required.

The Cost of Wholesale Power

The next column representing costs indicates the cost of energy delivered from the substation to the wholesale power consumer, such as municipalities and other electric utilities that redistribute power, railroads and large industrial consumers. The substation cost is increased for a short distribution for general expenses involved in the general supervision of the business and 7½ per cent payable to the state in taxes.

It is to be noted that the average consumption of energy by this group of consumers of the company in question totaled 87,000,000 kw-hr. per consumer per year. Two of the consumers purchased approximately 200,000,000 kw-hr. each during the year, or over 400,000 times the use of the average lighting consumer.

From the substation extend distribution lines out through the cities and rural territory, some in the form of underground cables, others in the form of pole lines, with branch lines here and there to factories or pumping plants. From these same lines the lighting consumers are served.

The cost of the energy increases rapidly in this retail distribution. The average cost of energy delivered to the power consumers is approximately 1.6 cents per kw-hr., or almost twice the cost at the substation. There has been a loss in the distribution, for the conductors are not perfect, and the transformers require some energy in their operation, though this is small. This loss increases the cost at the substation approximately 20 per cent. Then there is the interest, depreciation, maintenance and operation of the distribution system. Next the interest, depreciation, maintenance and operation of the service and meters, reading meters, preparing of bills, collecting of money, adds to the cost of energy. This latter cost, connected directly with the consumers' service, is not a large item per kilowatt-hour for the power consumer as his use averages approximately 2,000 kw-hr. per month. General expenses and taxes, mainly state taxes and franchise tax, further increase the cost.

The Cost of Residential Service

Considering next the lighting consumer, the enormous increase in cost is primarily a distribution and consumer expense. The distribution expense per kilowatt-hour increases largely because of the small amount of business that each consumer represents. On the lines of the company in question there were 194,000 lighting consumers, as compared with 16,000 power consumers, yet these 194,000 consumers use less than 7 per cent of the energy while the 16,000 representing 8 per cent of the consumers use 37 per cent of the total. The wholesale consumers, representing less than 0.5 per cent of the number of the consumers, use 41 per cent of the output. The average use per year of the lighting consumers is approximately 490 kw-hr. or 40 per month, while the average power consumer uses 50 times as much energy, and a wholesale power consumer almost 200,000 times as much energy. Fig. 5 is given to help visualize the relative extent of system to serve the lighting consumer compared with the wholesale

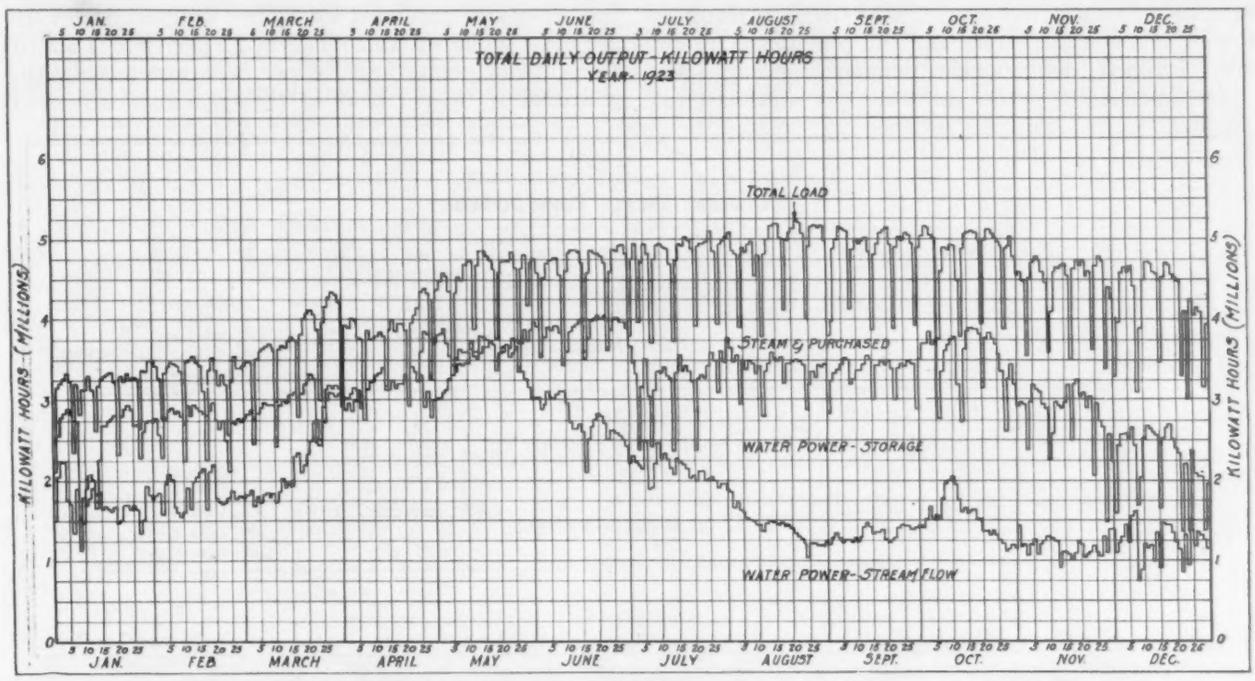


Fig. 4—Showing sources of power making up total daily output of one company for 1923

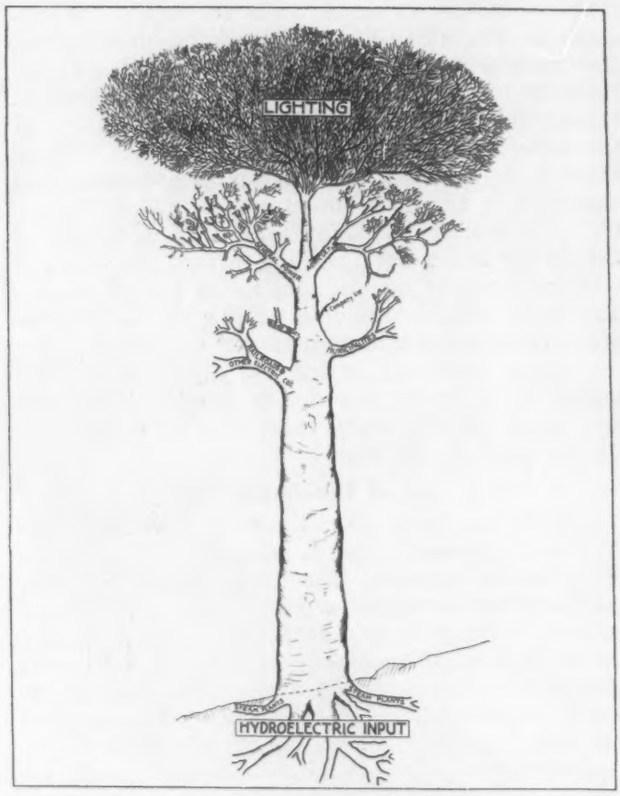


Fig. 5—Showing relative extent of system necessary to serve various classes of consumers

power consumers and also the relative size of each. It is not surprising, with this small retail business where investment must be maintained so that each small consumer is connected to the system 365 days in the year, or 8,760 hours per year, that the distribution expense materially increases. The biggest single item of expense in the service to the small lighting consumer, however, is that which is incurred almost between the street and the consumer's premises. Interest, depreciation, maintenance and operating expenses in connection with the service wires and meter, the reading of the meter, making out and presentation of bill, collection of money, amounts to approximately 75 cents per month per consumer and represents practically 2 cents per kw-hr. of average use. For the consumer using but 20 kw-hr. this is practically 4 cents per kw-hr. This cost varies but slightly with the amount of energy used by the consumer. Owing to the small use compared with the investment required to serve him, the labor and expense incurred in caring for his account and seeing that he is given good service, the expense of maintaining men at his call when fuses are burned out, and similar items of service, this cost is relatively large per kilowatt-hour and exceeds the entire cost of energy delivered from the substation.

General expense and supervision partly is incurred directly on account of the number of consumers and partly in general supervision on the entire system, and again the percentage paid for taxes increases the total by a greater amount per kilowatt-hour.

In general rate schedules, the rate for lighting service is higher than the total of 5.3 cents per kw-hr. stated here. Full consideration in this analysis has not been given to the higher class of service required by lighting service than by power and other items which tend to justify higher rates than the costs indicated. From a strictly cost basis, the lighting consumer properly should be charged a fixed sum per month, say 75 cents or $1 plus a lower rate for energy consumed. Such a form of rate probably would result ultimately in lower rates to the consumers and make available, to those who desire, relatively low rates for additional service for other conveniences in the home.

Referring to the other charts which are presented, Figs. 6 and 7 show in the form of a flow diagram which might be compared with a stream the flow of energy in the hydroelectric system. For the year 1923, a normal year, it appears that 73 per cent of the energy is produced by hydro, approximately 10 per cent is lost in transmission, 21 per cent is added from steam plants and 5.6 per cent purchased. Approximately 50 per cent of this power is delivered

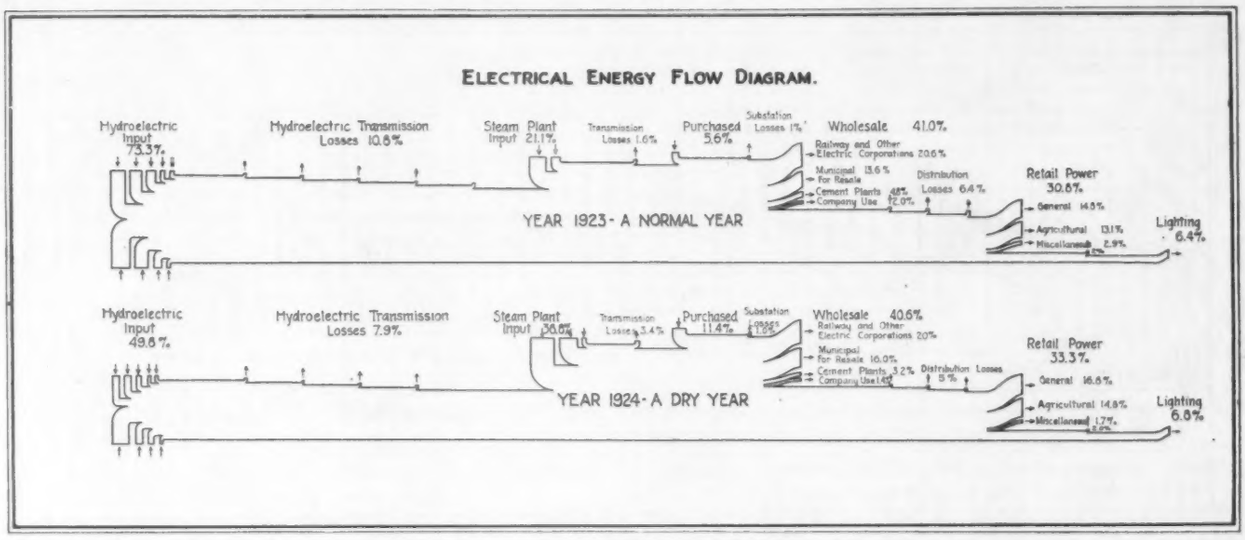


Fig. 6.—Showing the relation of hydroelectric to steam-electric input and channels through which power was sold during a normal and a dry year

wholesale to 7 consumers, 30 per cent to retail power consumers totaling 16,000 and the 194,000 lighting consumers actually purchased only 6.4 per cent of the total energy.

In a dryer year, 1924, the hydro output shrunk to 50 per cent and it was necessary to produce by steam and purchase the other 50 per cent. In April, 1923, 84.5 per cent of the energy was produced by hydro, in September, 1924, but 20 per cent, and the steam plant and purchased power output increased from 15.5 per cent to 79.8 per cent. During the wet month 43.5 per cent of the power produced was for wholesale power, 43.6 per cent retail power and lighting and distribution losses. It is to be noted that though in the wet month of April only 14 per cent was required by agricultural users in a month when the hydro-electric power was the minimum the agricultural demand increased to 24 per cent.

Space is not available to go into detail relative to the costs and their specific make-up. The analysis showing the variation in cost of rendering service to consumers, dependent upon the size of the installation, in itself readily could be the subject of a special article. One example, however, of the variation in the cost of delivering service may suffice to indicate the general situation.

Table I sets forth the average investment in transformers, service and meters necessary to connect up different sized motor installations to the 11,000-volt distribution lines generally used in service of agricultural pumping installations. There is set forth also the annual cost in total and the annual cost per horsepower incurred by the company as the result of maintaining this equipment for the consumers' service. These costs, increased for taxes and general expense as shown in the sixth column, represent the minimum out-of-pocket cost to the company for being ready-to-serve the different sized installations. Nothing is included to cover the cost of production, transmission or distribution of the energy to the transformers located next to the consumers' pumping plants. On the distribution system studied, the distribution cost representing interest, depreciation, maintenance and operation of the pole lines from the substation to the consumers' transformers, aggregates an annual charge of $5.25 per horsepower served. If this cost, which represents an expense whether the motors are operated or not, is added, together with the general expense in taxes applicable, the total annual cost per horsepower for the distribution of the power from the substation to the consumer on the 11,000-volt rural distribution system would increase to that shown in the last column.

Table I—Annual Cost of Distribution of Power on 11,000-Volt Rural System to Motor Installations*

Size of motor in hp.	Transformer service and meter: Investment		Annual cost including interest and expense		Annual cost including general expense and taxes per hp.	Total annual distribution expense from substation to consumer per hp.
	Total	Per hp.	Total	Per hp.		
3	$190.00	$63.33	$34.51	$11.44	$12.95	$18.89
5	302.00	60.40	48.20	9.64	10.91	16.85
7½	341.00	45.47	53.91	7.19	8.14	14.08
10	351.00	35.10	55.30	5.53	6.26	12.20
20	488.00	24.40	74.40	3.72	4.21	10.15
50	746.00	14.92	113.30	2.27	2.57	8.51
100	1,128.00	11.28	172.00	1.72	1.95	7.89
300	2,026.00	6.75	332.90	1.11	1.26	7.20
500	2,590.00	5.18	451.90	.90	1.02	6.96

*This is additive to cost of power delivered to distribution system from substation, to give total cost.

With an average cost of energy delivered from the substations of approximately 1 cent per kw-hr., increased for distribution losses of approximately 20 per cent, the cost of service, were the distribution system in question to bear the full average cost of distribution, might be written as the charges per horsepower listed in the last column of this chart plus approximately 1¼c. per kw-hr. used.

The above will indicate some of the causes of variation in rates for power service, why rates for small installations are greater per kilowatt-hour and per horsepower than for large installations, and why the rate per kilowatt-hour of energy for power service reduces as the use per month increases.

Many other analyses, somewhat similar to this, could be submitted but it is believed that sufficient has been set forth to indicate the fundamental reasons for the wide variation in rates found in the schedules generally charged by electric utilities.

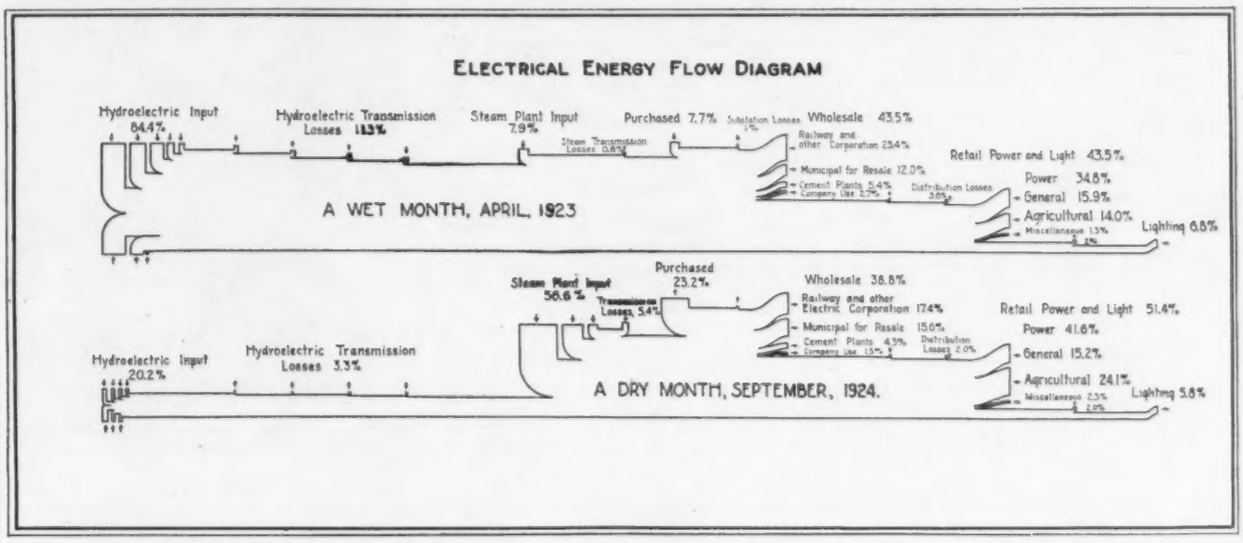


Fig. 7—Showing relation of hydro and steam-electric input and channels through which power was sold during a wet and a dry month

CENTRAL STATION CONSTRUCTION OPERATION AND MAINTENANCE

Carriage for Oil Filter Press Proves Labor Saver

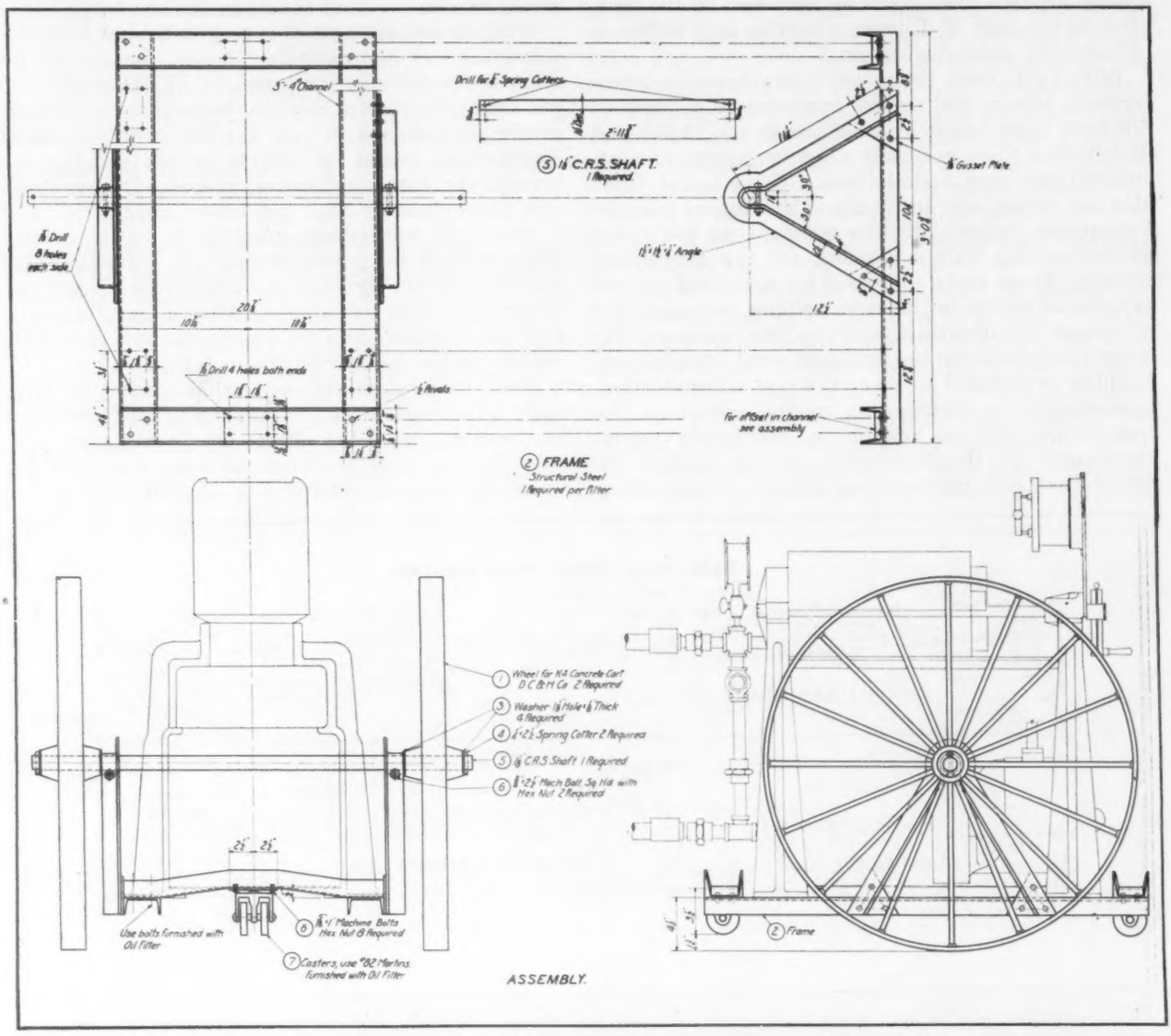
Economical and Easily Made Transporting Device Makes all Parts of Station Yard Readily Accessible

An oil-filter press is a handy piece of equipment to have around a station provided it is sufficiently portable. In the old-style station where all of the oil-filled apparatus was situated within the four walls of the building, the ordinary caster-fitted dolly sufficed admirably. However, with the advent of outdoor equipment with graveled walks and lawn plots intervening, the oil filter fitted as above described proved to be portable in name only.

The use of a portable oil-filter press is confined principally to small transformers and high-voltage oil-circuit breakers and in stations where it is not considered essential to have oil-storage tanks. Where portable outfits are used, conduits are run and power outlets provided for the convenient operation of the filter press. This facility is provided for both indoor and outdoor substations.

The 7-in. filter press used by the Pacific Gas and Electric Company weighs roughly 500 lb. To facilitate the ready movement of this piece of equipment, a light steel framework was devised. This is made up by the company and consists of channels, angles and small plates. The accompanying illustration shows the structural details and important dimensions. The wheels are ordinary concrete buggy wheels of 30-in. diameter.

This carriage makes it readily possible for one man to handle the press over comparatively rough ground. If the press is to remain in one place for some time and the wheels interfere with the changing of blotters, the wheels may be taken off and laid aside until

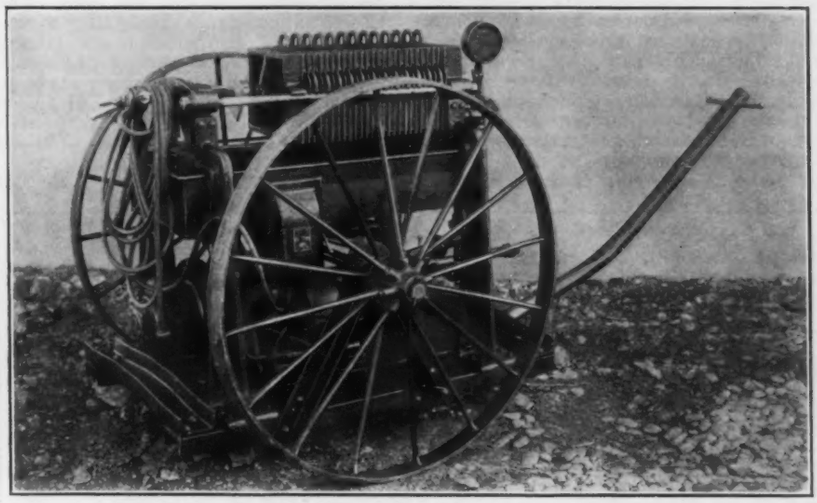

3"-4" Channel
Drill for ⅜" Spring Cotters
⑤ ⅝" C.R.S. SHAFT. 1 Required
⅜" Gusset Plate
Drill 8 holes each side
1½"×1½"×¼" Angle
⅝" Drill 4 holes both ends
⅜" Rivets
for offset in channel see assembly
② FRAME. Structural Steel 1 Required per filter
① Wheel for 14 Concrete Cart D.C.B.M. Co. 2 Required
③ Washer ⅝" Hole × ⅛" Thick 4 Required
④ ¼"×2½" Spring Cotter 2 Required
⑤ ⅝" C.R.S. Shaft 1 Required
⑥ ⅝"×2½" Mach. Bolt Sq. Hd. with Hex. Nut 2 Required
Use bolts furnished with Oil Filter
⑥ ⅝" Machine Bolts Hex. Nut 8 Required
⑦ Casters, use "82 Martins furnished with Oil Filter
② Frame
ASSEMBLY.

Construction details of 7-in., 500-lb. filter-press designed for use in stations of the Pacific Gas and Electric Company

again needed. To accomplish this all that is necessary is to slip out the cotter keys from the ends of the shaft and slip the wheels off.

In substations employing large transformers and oil circuit breakers where considerable oil is handled, portable presses are not used; instead an oil piping system is installed, and the cleaning of oil is done at a central point where handling tanks are installed.

To facilitate the handling of the centrifugal oil filters which are being used by this company at present, a carriage similar to that used for the filter press now is being developed.



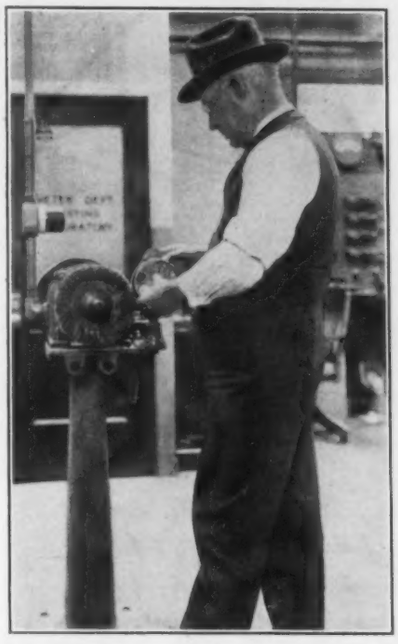
Portable oil filter press used by the Pacific Gas and Electric Company

Watt-hour Meter Cleaned, Painted and Stenciled for 4 Cents

By W. H. TALBOTT

Superintendent Electric Meter Department, San Diego Consolidated Gas & Electric Company

Most of those who are responsible for the operation and maintenance of an electrical distribution system are so busy with the engineering problems



Meters brought in from old installations usually have to be thoroughly cleaned before repainting

that the little things which help to make is thoroughly cleaned, it is painted by the use of an air brush. This painting an efficient organization are sometimes overlooked.

Thinking that it might be of interest, I therefore am giving a description of the method used by the San Diego Consolidated Gas & Electric Company for cleaning, painting, and numbering electric meters. This would seem a small item, but when it is considered that several thousand meters are handled each year an up-to-date method is very much desired. The system described is not new, as it is in use in a number of places. However, we feel that there are those who would adopt such a plan if the cost were not too great.

When meters are received from the manufacturing company, it is necessary to number and make a complete record of them. In most cases company numbers are stenciled on the case, after which the meter is tested and placed on a storage rack until taken out by the installer. For stenciling, a No. 72 Ideal stencil cutter is used. The number is cut and then stenciled on the meter case with an air brush. This makes a very satisfactory job and is done quickly, requiring less than a half minute per meter. This is less time than it would take to put metal stencils together.

Meters that are removed from the lines usually have to be cleaned, repainted, and renumbered. This is accomplished easily in a systematic way. Meters first are segregated according to sizes and voltage, after which the cleaning is done by using a buffing machine, which is shown in one of the accompanying illustrations. After the meter is done in a cabinet from which an exhaust pipe leads to the roof of the building. In connection with the exhaust pipe is a 16-in. fan which draws all fumes from the cabinet, therefore removing all odors which are usually present when using an air brush. An idea of the cabinet and method of using it is given in one of the accompanying illustrations. The speed with which a man can clean, paint and number meters is one of the most important features. Three minutes per meter is the average time required with the described equipment and the cost does not exceed 4 cents per meter. The cost of the equipment is as follows:

The air brush saves much time and effort in meter stenciling and painting operations

Paint cabinet	$ 88.58
Buffing machine	130.00
Stencil cutter	60.00

The above equipment has other uses which add to the efficiency of the department.

Love Life of an Engineer

Fools may sing of hearts and love
  And eyes and cheeks and hair—
Write sonnets to a woman's glove
  And swear her wondrous fair.
Bah! she's an artificial thing,
  All powder, paint and lipstick—
But hearken to the song I sing,
  And hail my love, the slipstick!

Women are babbling all the time
  Of dates and drinks and dresses,
Which wouldn't help at all when I'm
  Computing torques and stresses.
It conquers without fear or doubt
  Whole hosts of sines and surds,
And helps me work in peace without
  An avalanche of words.

Slide-rules are always accurate
  And women never so;
And while they're not affectionate,
  They never answer "No!"
So hence with women's wanton ways
  With eyebrows, lips and curls,
My little log-log polyphase
  Is worth a dozen girls!

—Synchronizer.

The General Electric Company has announced the re-design of its type CR-1034 hand-operated starting compensators. The new design is expected to accomplish closer overload protection through the use of temperature overload relays instead of dashpot relays. One size is manufactured with a multiple-rated auto transformer adapting it to use on motors of various sizes for a given voltage. Refinements in the push-button control are included.

Chart Simplifies Distribution Line Calculations

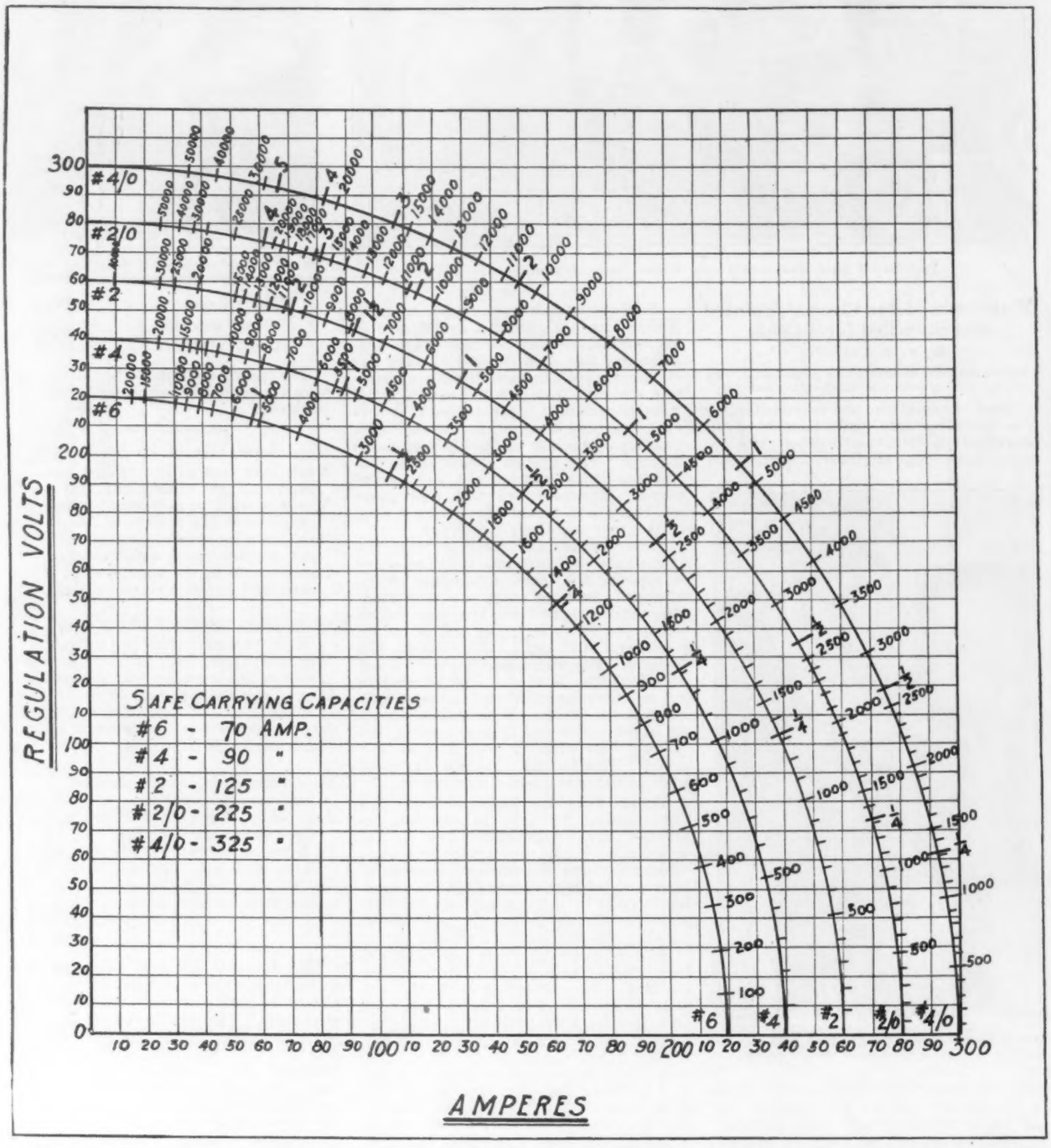
Circuit Characteristics Quickly Determined from Diagram Which Combines Four Important Variables

By J. C. CAREY and C. V. FAIRCHILD
Engineers, Distribution Department, Southern California Edison Company, Los Angeles

For some time this department has felt the need of a simple and practical method of computing three-phase distribution line characteristics. At the present time an ampere-feet table, based on resistance only, is included in the company's Book of Standards and is in general use. However, due to the increasing demand for closer voltage regulation and the loading-up and lengthening-out of so many of our heavy feeders, it seemed necessary to include inductive reactance in the consideration of distribution line characteristics. It was desired that a single chart, or table, be constructed which would be applicable to the greatest number of cases and would still be simple and not contain too many variables.

The accompanying chart is based on a "Chart for the Regulation of 50-Cycle Transmission Lines and Distribution Lines," by H. B. Dwight and published in the Journal of Electricity, Power and Gas, Feb. 21, 1914, p. 161. It is for the special case where the effective spacing of the conductors is approximately 1.5 ft., the power factor is 80 per cent and copper conductors only are used. This effective spacing is applicable to our standard "L" arm which is used almost entirely for 2,300-volt or 4,000-volt primaries and in a great many cases for secondaries. A power factor of 80 per cent is used, but there is very little error if it should vary between 65 per cent and 100 per cent.

This chart has four variables: sizes of



Distribution circuit regulation diagram which combines conductor size, load current, line length and voltage drop in such a way that if any three of these variables are known the fourth may be determined at a glance by the use of a straight-edge placed on the diagram as explained in the text

wire, length of line, load in amperes, and line drop, designated as regulation volts. There are five arcs, representing No. 6, No. 4, No. 2, No. 2/0 and No. 4/0 copper wire. The small-sized figures around these arcs are for the length of three-phase line in feet; miles and fractions thereof are designated by the larger-sized figures. Load amperes in one wire are along the abscissa and volts drop along the ordinate. Regulation volts may be considered as line drop for short distribution lines where capacity can be neglected. For single-phase lines, compute the same as for three-phase and divide the resultant line drop by 0.866.

To use the chart: Lay a straight-edge across the chart from the origin to some distance point on the arc for the desired size of wire. Where the load in amperes intersects the straight-edge, read across to the left for regulation volts or line drop. The procedure may be varied to find any one of the four quantities when the other three are known.

For example:

Problem 1.

A No. 2 feeder carries 100 amp. per phase to a center of distribution 1 mile from the substation. What is the voltage drop in the feeder?

Lay a straight-edge across the chart from the origin to the 1-mile point on the arc for No. 2 wire. It will be found that the line extending up from 100 amperes intersects the straight-edge opposite 174 volts, which is the voltage drop in the feeder.

Problem 2.

It is desired to run a three-phase, 440-volt line, 1,400 ft. to a 50-hp. 440-volt motor. What size wire should be used so that the voltage drop in the line will not be more than 10 per cent?

A 50-hp., 440-volt motor requires approximately 64 amp. The allowable voltage drop is 44 volts. Lay a straight-edge from the origin to the intersection of the line from 64 amp. with the one from 44 volts. The straight-edge will be found to intersect the arc for No. 6 wire at 1,000 ft. and the No. 4 arc at about 1,500 ft. Use No. 4 wire.

Problem 3.

How far can 100 amp. (per wire) be carried on a three-phase, No. 2 feeder, at 4 kv. with a voltage drop of 5 per cent?

The allowable drop is 200 volts. Lay a straight-edge from the origin to the intersection of the line from 100 amp. with the one from 200 volts. It will be found to intersect the arc for No. 2 wire at approximately 6,000 ft.

Problem 4.

A No. 2/0 feeder is 3,000 ft long. The voltage at the substation is 2,300 volts. What load can be carried over this line with a voltage drop of 5 per cent?

The allowable drop is 115 volts. Lay a straight-edge from the origin to the 3,000-ft. point on the 2/0 arc. The line extending across from 115 volts cuts the straight-edge at approximately 183 amp.

Turpentine vs. Iodine for the Plant First-Aid Box

One of our subscribers asks: "Has spirits of turpentine any medicinal, or preventive-of-infection value when applied to open wounds?"

He asks this question because he has charge of the upkeep of his company's first-aid kits, replenishes exhausted supplies and keeps the kits clean and in good paint, and every once in a while he finds in one a bottle of turpentine. This is removed immediately according to instructions. Then a loud complaint is heard from the old-timer who put it in the kit when he discovers that his pet medicine is gone.

However, the first-aid man reasons that his company would not pay perhaps $15 a gallon for iodine, or whatever they use for sure-fire first-aid work, if turpentine at $2 or less per gallon was "just as good."

This question is raised because serious cases of infection have occurred among linemen, groundmen and others who have used turpentine for first-aid work instead of the antiseptic of real value.

Lake Chelan (Wash.) in the middle distance and the Columbia River in the foreground. Fruit warehouses of the Bee Bee Orchard District are shown strung along the right-of-way of the Great Northern Railway while the town of Chelan appears in the distance at the foot of the lake. The 60,000-volt transmission line which seems to disappear down the hill and challenges the eye to follow it across the river in the left foreground is the tie line built in 1923 by The Washington Water Power Company from Coulee to Chelan to connect that company's system with the acquired properties of the Okanogan Power & Light Company. The Cascade Mountains may be seen at the head of the lake. The Chelan River power site of The Washington Water Power Company is in the gorge at the left center of the picture near where the Chelan flows into the Columbia. The confluence of these two rivers is just outside the picture to the left

IDEAS FOR THE CONTRACTOR

California Electragists Study Estimating Methods

Successful Method Used by Southern Division to Sell Its Members Electragist System of Estimating

By C. J. GEISBUSH, Executive Secretary

After making an analysis of the problems facing the members, the Southern Division of the California Electragists came to the conclusion that the first big problem to be considered by them was the subject of correct estimating. They realized this was the basis of all electrical contracting, for to be successful an electragist must know his costs and have confidence in them.

A detailed study was made of the method of estimating advocated by the Association of Electragists, International. A number of actual jobs was estimated using the Electragist Manual of Estimating, and these estimates were checked against the actual job as it progressed and also after its completion. The results were very encouraging. Ways and means then were devised for presenting this system of estimating to all of the members of the Association.

A large-sized plan of a one-story building on a scale of three-fourths of an inch to one foot was drawn for the purpose of explaining to the members the proper method of layout for any job regardless of size; the use of the wiring symbols as adopted by the American Institute of Architects and the Association of Electragists, International; and third, but not least, the simplicity with which materials can be taken off a print once the electrical system has been laid out properly. Estimating classes are conducted at meetings in various cities. For the purpose of brevity materials on only one store and all the feeders are taken from the print. The method used in taking off the entire job would be no different than that used in taking off one store, and the lesson remains just as valuable to the members.

The architectural details of this job were laid out with red ink and the electrical system with black so as to have the most contrasting colors, black and white, for the conduit system. This was done by Lee C. Baltzelle of the J. J. Farley Company, Fullerton, who is serving as estimator in presenting this to the members. This sheet usually is placed on some sort of blackboard and illuminated so that Mr. Baltzelle easily may show to the assembly the steps used in taking off material. Three of the five job forms have been enlarged to 2 x 3 ft. These are hung close to the large diagram, and as quantities of materials are taken from the print the proper place of entry is designated by the speaker. Each member has, at his place, one complete set of the five job forms and a photostat of the plan of the job being estimated. These job forms and the photostat are clipped to a board so that the members may turn away from the table and enter the items with ease.

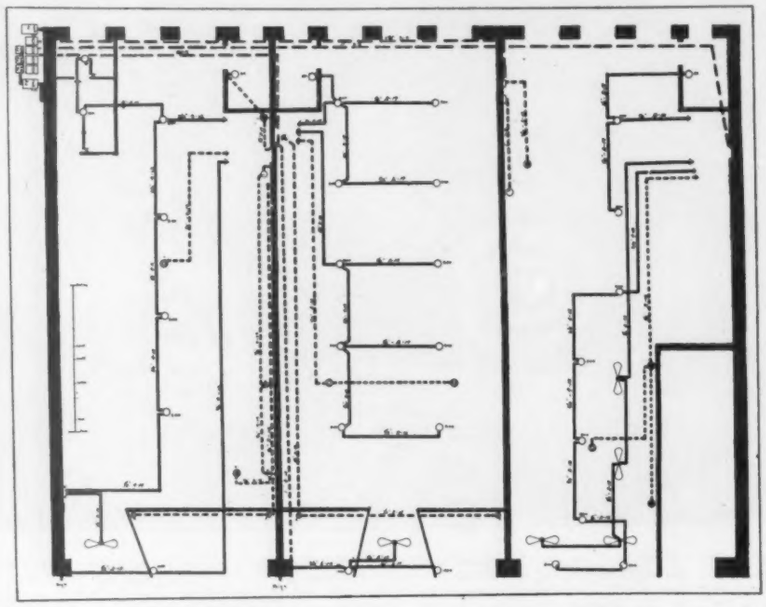
The materials are taken off the sheet by the use of a rotometer and tallying machine as recommended by Arthur L. Abbott, chairman, Cost Data Committee, Electragists, International. Every movement of the estimator is traced by each one present on his photostat of the plan. The various material quantities are noted by each member present. After all materials have been taken from the plan and summarized, a transfer is made to the pricing sheet, special attention being shown to the checking of material quantities as taken from sheets 1, 2 and 3 and placed on pricing sheets 4 and 5. This is especially necessary as it provides a check on the entire job and prevents the possible overlooking of any quantity. The conversion of material into labor is done by the use of the Electragist Manual of Estimating. It is to be regretted that sufficient supply of these manuals is not available to give one to each member present, but as it is the labor units covering the various materials listed are given by the estimator from the only available Data Book. No material prices are noted as we are concerned entirely with the take-off of quantities and the conversion into labor.

Every detail in connection with the use of the system is explained as the estimating progresses, and any questions of those present are discussed. As each member has a photostatic copy of the plan and all of his estimating sheets, he can go over the job at his office at any time and clear up any details which may slip his mind. This method of selling the Electragist system of estimating to the members is very successful and is receiving their wholehearted support, as indicated by the fact that in every section orders have been placed for the complete Electragist Data Book Service, a complete set of job forms, a rotometer and a tallying machine. The sets, tallying machine and rotometer are furnished to the member at cost.

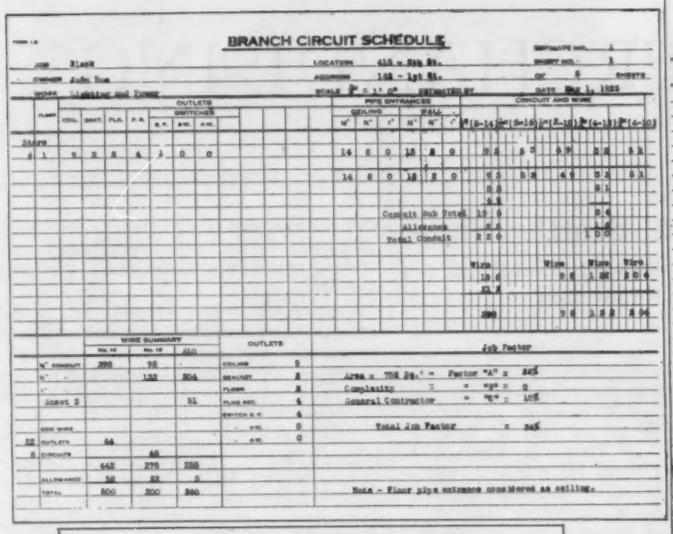
The writer wishes especially to commend Mr. Baltzelle for his unselfish sacrifice of time in the preparation and presentation of this system of estimating.

The Southwestern Light Company, formerly at 2521 E. Fourth Street, Los Angeles, has opened a new store at 2814 Brooklyn Avenue. Edward B. Raskin is the proprietor. He will continue in the contracting business but will carry an increased stock of electrical supplies and appliances.

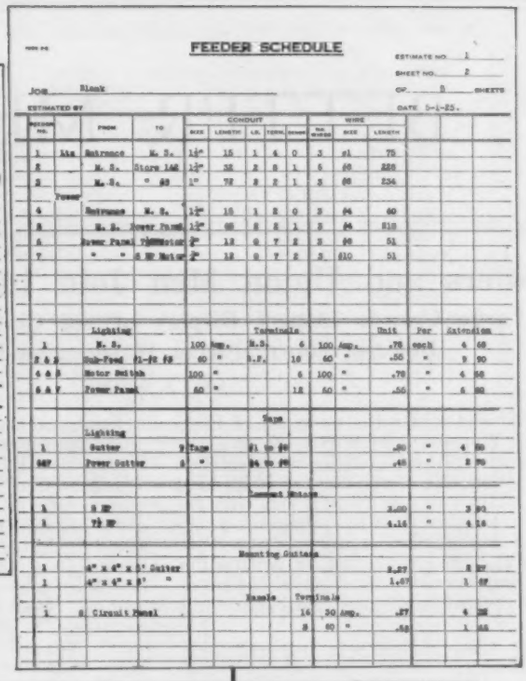
The Blackie Electric Maintenance Company is the firm name of a new electric service shop recently opened at 1422 West Ninth Street, Los Angeles.



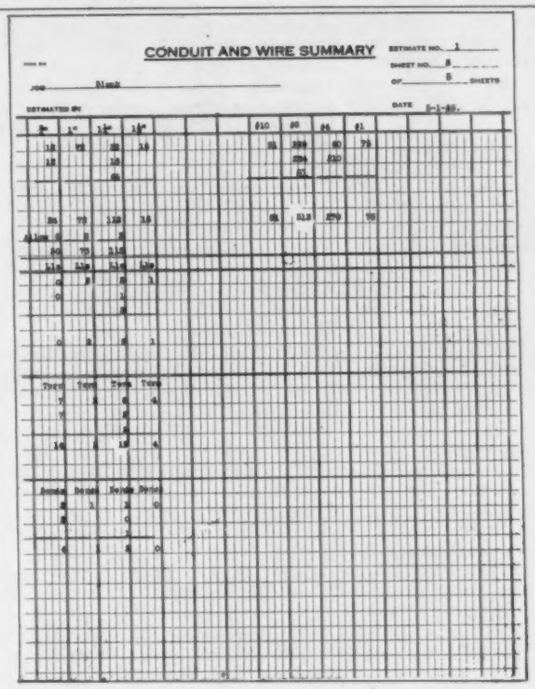
Photostat of the plan being estimated. The store on the left was the one used in the study of estimating



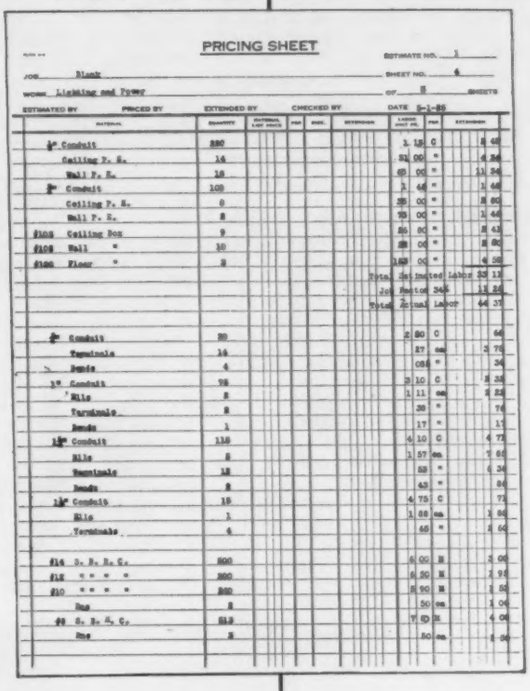
BRANCH CIRCUIT SCHEDULE



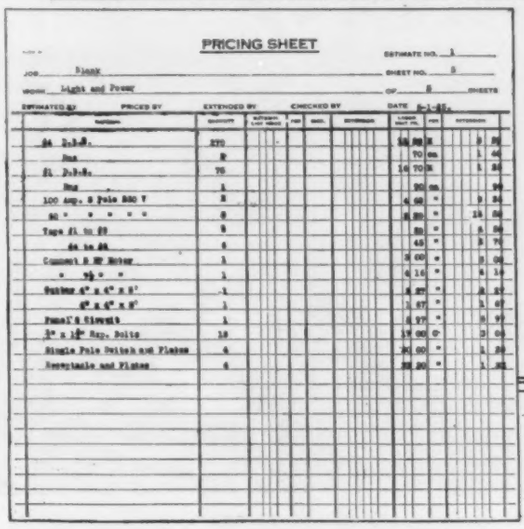
FEEDER SCHEDULE



CONDUIT AND WIRE SUMMARY



PRICING SHEET



PRICING SHEET

ELECTRAGIST estimating sheets used in study of this system by Southern Division of California Electragists. These sheets are filled in by each man attending the course as the material is taken off by the estimatro.

BETTER MERCHANDISING

Dealers and Union Men Join in Seattle Show

Large Crowds Inspect Display of All Classes of Electrical Devices Shown During Washington Exposition

By C. A. OSIER

Produced under the auspices of Electrical Workers Union No. 46 and the Electric Club of Seattle, an electrical exposition, one of the largest of its kind ever staged in the Northwest, was recently held in Seattle. Original plans called for a show running from Feb. 16 to 21, but due to popular demand the time was extended three days, the exposition remaining open until midnight Feb. 25.

The show which was brought to a culmination with the election and crowning of Queen Electra, Miss Sylvia Dick, the entry of the Puget Sound Power & Light Company, was unique in many ways. For the first time in the history of Seattle a concerted effort was made to show every possible phase, appliance and machine in the electrical field, the entire electrical industry in Seattle joining forces in the undertaking.

More than fifty Seattle firms dealing in electrical merchandise, maintained booths, exhibiting and demonstrating everything from a curling iron to a power plant. Particular emphasis was laid on the demonstration of all classes of domestic appliances. Radio also played an important part in the display. Several of Seattle's leading radio distributors joined in the exhibition with complete outfits of latest developments. In addition to numerous receiving sets to be seen, radio fans witnessed for the first time broadcasting exhibitions.

The object of the show was two-fold —first, to acquaint the general public with the latest developments in electrical science, reflecting the advance the industry has made; and second, to raise a fund for the entertainment of some 1,000 delegates to the convention of the International Brotherhood of Electrical Workers that is to be held in Seattle beginning Aug. 17. This convention will draw delegates from all parts of Canada, the United States, Mexico, Panama, Hawaii and the Philippines, and will last from a week to ten days, this year's meeting requiring more time than usual because of a joint meeting of the Electrical Workers' Benefit Association, an inter-insurance society within the brotherhood.

The exposition was held at the Hippodrome and, following a prearranged schedule, the doors were opened at 2 p.m. daily, remaining open until 12:30 a.m. The afternoon program, starting at 2:15, included educational motion pictures showing the development of electricity and its uses, a concert and vaudeville entertainment and closed at 5 o'clock. The evening show, starting at 8:15, featured a vaudeville performance of eight to ten acts, including singing and dancing specialties. From 8:45 to 9:15 there was an intermission to permit visitors to view the demonstrations and inspect the exhibits, this being followed with another show which ended about 10 o'clock. From 10 to 12 dancing was in order, music being furnished by a twelve-piece orchestra.

Special electrical stunts were staged from the different booths each night. In this way the exhibitors were given an opportunity to draw particular attention to their displays.

Originally it was the intention of the management to charge fifty cents admission, but at the exhibitors' request the charge was cut to twenty-five cents. This charge covered everything—exhibition, vaudeville show and two hours dancing.

Exhibitors were allowed to solicit orders and to make sales and, although it was not the object of the exposition, many of the concerns reported numerous sales made and an unlimited amount of inquiries received.

The men directly in charge of the exhibition were: Frank Gates, manager of the show; Dave Fink, chairman of the arrangements committee; B. F. Gordon, chairman of the joint committee of the Electric Club of Seattle and the Brotherhood of Electrical Workers in charge of the exhibition; A. J. Sears, chairman of the floor committee; R. T. Sinex, consulting engineer of the exhibition; and W. E. Jones, chairman of the committee of the Electric Club of Seattle.

The executive committeemen were: B. F. Gordon, chairman; W. E. Jones, Walter Funfsinn, T. S. Wood and R. T. Sinex. Other committeemen included: Lighting and decorating—A. G. Heller, L. D. Morgan and R. T. Sinex; floor committee—A. J. Sears, chairman; Electric Club of Seattle—W. E. Jones, chairman; L. R. Grant, H. E. Gleason, L. C. Warner, Walter Funfsinn, J. R. Wells, T. S. Wood, J. Zancker, T. W. Reed and B. F. Gordon.

Sixteen Seattle girls, representing twelve electrical firms and organizations, were entered in the popularity contest from which Queen Electra was chosen. Every visitor to the show was entitled to a vote, and the contest was spirited from the opening day.

Miss Dick, after being crowned Queen Electra by H. J. Martin, substituting for Mayor E. J. Brown as High Lord Chamberlain of the Kingdom of Invisible Force, was presented with a diamond ring, the gift of the electrical industry.

Two of the exhibits shown during the exposition. Demonstrations of domestic appliances formed an important part of the exposition

WINNING exhibits presented in the June Bride window decorating contest conducted by the California Electrical Bureau. Prizes totaling $125 were awarded to the firms presenting the displays shown on this page. The photographs are numbered corresponding to the prizes won. (1) Valley Electrical Supply Company, Fresno. (2) Thomas Day Company, Oakland. (3) J. A. Newton Electric Company, Glendale. (4) Southern Electrical Company, San Diego. (5) Westwood Electrical Company, San Francisco. (6) Central Electric Company, Watsonville. A number of other photographs were entered in the contest which was held during the first week in June. The four judges are representatives of leading San Francisco advertising agencies.

NEWS OF THE INDUSTRY

Hetch Hetchy Penstock Lines Ruptured Due to Operating Error

Surges, resulting from the failure of an operator to open a by-pass valve before opening a main gate valve, resulted in injury to three of the four 66-in. lap-welded, steel penstock lines at the new Moccasin power plant of the city of San Francisco on July 30. The ensuing flow of water, mud, trees and other debris littered up the switch and transformer yard and filled the basement of the power house to within a foot of the ceiling before the water could be shut off at the surge chamber. No damage to any of the electrical apparatus was sustained beyond the wetting of the lower section of the four generators. Water crept up until it covered the lower coils of the machines to a depth of about a foot. This necessitated repeating the dry-out process on the generators which had been ready for service but a few days when the accident occurred.

All of the generators had been operating for the purpose of wearing in the bearings, adjusting the control and operating mechanisms and other necessary preliminary adjustments. About three o'clock in the morning the night operator thought that one of the bearings on No. 4 unit was running hotter than it should and accordingly shut down the unit as instructed. Great care has been taken in the preliminary operation of all of the machines to prevent accidents and to watch for any possible difficulties which might arise.

At seven in the morning, when the day crew came on shift, it was decided again to start No. 4 unit for observation. It was at this time that the main gate was opened without first opening the by-pass valve. This action permitted too rapid filling of the lower 50-ft. section of the penstock and set up a series of surges in the penstocks which resulted in the rupture of the No. 4 line up on the hill about 1,000 ft. above the power house. Immediately the other units were shut down, but it was impossible to operate the butterfly valves near the surge chamber for nearly a half hour due to the fact that the electric control had not been completed between the switchboard and the valve operating mechanism. These valves were arranged for temporary operation with an air-drill mechanism and before this could be operated it was necessary to start up the construction-camp air compressor and send a man to the top of the penstock lines to perform the operation. Due to the early hour, this took considerable time.

The split in the No. 4 water line occurred at the weld and was about 10 ft. long. A peculiar feature of the accident as a whole is the fact that some fifteen minutes after the rupture of penstock No. 4, penstock No. 1 also developed a serious split. No possible connection exists between the two water lines except through the surge chamber farther up the hill. However it is believed that the length of pipe was right for the surges set up to act accumulatively until reaching a magnitude sufficient to rupture the pipe. Had it been possible to shut the upper butterfly valves it is probable that the trouble with the No. 1 line would not have developed.

A 6-in. split also appeared in the No. 3 line which joins the No. 4 line a short distance above the original break. New sections of pipe manufactured especially for the repair job were rushed to the project and installed without further mishap.

Damage to the pipe lines themselves was purely nominal, nothing other than the ruptured sections being harmed seriously. One or two of the concrete saddles were slightly injured due to the sudden later movement on the pipe when the water hammer occurred. The heavy and prolonged flow of water washed all of the top soil away from the anchors in many places, but caused no damage whatever to the anchors. A section of the Hetch Hetchy railroad was washed out and a section of the tram line adjacent to the penstocks was washed out also. Aside from this and the debris washed into the power house and bus yard no damage other than as set forth occurred. The total cost of replacing the damaged pipe sections, replacing the railroad and the tram line and of cleaning up the power house and bus yard amounted to about $25,000. Due to the fact that arrangements were not completed for the delivery of power to the Pacific Gas and Electric Company at Newark, no loss in revenue resulted from the accident. No personal injuries were sustained.

Copco No. 2 Plant Is Dedicated Formally on July 5

Formal dedication of the Copco No. 2 plant of The California Oregon Power Company was conducted in the presence of approximately two thousand customers, stockholders, business men and bankers on July 5. Following the opening ceremonies people from all sections of northern California and southern Oregon were the company's guests at a luncheon.

The plant representing an investment of $4,000,000, is located on the Klamath River in northern California about a mile below Copco No. 1 plant and a few miles south of the Oregon-California border. Two 15,000-kw. vertical type generators, which are driven by two 20,000-hp. turbines, operating under a head of 140 ft., are installed in the new plant.

A long term contract with the Pacific Gas and Electric Company provides for the sale of a large portion of the output to that company. For the delivery of this energy a 77½-mile 110-kv. single circuit, wood pole, transmission line has been constructed, connecting the plant with the lines of the Pacific company at Delta, Calif. The plant also is tied in with the California Oregon company's system.

Interconnection in Oregon Will Close Transmission Gap

Work is under way by the Portland Electric Power Company, Portland, and the Mountain States Power Company, Albany, Ore., which will close, about Oct. 15, 1925, one of the two remaining gaps in the transmission systems between the Canadian and Mexican borders. The gap to be closed is that about eighteen miles in extent between Salem and Independence, Ore. Formal announcement of this significant step in interconnection in the Northwest was made recently on completion of the contractual provisions of the tie-in between the two companies, which, in general, provide for an interchange of current mainly for emergency purposes in any amount up to 7,500 kva., the capacity of the connecting auto-transfomer.

The actual point of contact between the systems of the two companies will be at a new steel switch yard under construction by the Portland Electric Power Company at West Salem. This structure is designed with positions for four radiating lines: one for a tie line with the Portland company's steam plant at Salem; one for the Southern Pacific's electric railway feeder; one for the new 57,000-volt transmission line from Portland to Salem, now under construction by the Portland company; and one for the new 66,000-volt transmission line of the Mountain States Power Company from Independence. The 7,500-kva. auto-transformer will be located at this switch yard between the last two lines to compenstate for the difference in transmission voltages of the companies. This transformer as well as switching and protection equipment incident to the tie-in will be installed by the Albany company.

Power Company Buys Dam Site.—One of the first steps in the development project planned by the Feather River Power Company, San Francisco, was made recently when the company completed negotiations for the purchase of the Jones estate, known as Buck's Ranch, in Plumas County, Calif., according to press announcements. The property will serve as the site of a proposed dam to be erected on Buck's Creek that will impound 110,000-acre-ft. of water.

Report on Columbia River as a Waterway Issued by Portland Club

A comprehensive report on the "Upper Columbia River as a Waterway," with respect to its three possible uses, navigation, irrigation, and power development, has been issued by the City Club of Portland through a committee composed of L. A. Andrus, trust officer for Strong & McNaughton, chairman, L. K. Hodges, The Oregonian, and F. H. Murphy, illuminating engineer, Portland Electric Power Company. The report, which is exhaustive, has been divided into four main divisions: (1) a summary of conditions to be considered in solving the problem; (2) conclusions as to principles which should govern development; (3) recommendations that the City Club take action along certain lines; and (4) detailed information on which conclusions and recommendations are based.

In presenting the problem, the report says:

> The upper Columbia and its chief tributary, the Snake, drain 252,000 of square miles of sparsely populated agricultural land, a territory in which there is only one large city above Portland and that located on neither stream, in which there is practically no manufacturing, except the pine lumber industry, and in which the extractive industries are as yet of minor importance.

The problem pertaining to the relation of the irrigation use of the river to the power use is expressed as follows:

> The undeveloped arid lands bordering these streams lie at such elevations and distances and the contour of the valleys is such that gravity canals for delivering water from these rivers are not ordinarily feasible and most of these irrigation projects can be watered only by means of pumping plants. Fortunately, the flood period of both streams coincides with the period of maximum demand for irrigation as well as with the time when the secondary, or flood water, power of any power plant is the greatest.

Recognizing that in any work for improving navigation conditions or developing power the most expensive structure, the dam, is common to both, the report states that "such improvements can be built most economically when built concurrently," and continues as follows:

> Canalization and power development are thus brought into being together, thereby providing a transportation artery on which may be carried the products from the expenditure of the power.
>
> Power developments on these rivers result in the generation of blocks of power of such size as to be unwieldly and unless there be a demand for a considerable proportion of the possible primary power of any project at the inception of the development, the carrying charges during the early years will make the project commercially impracticable.
>
> It has been estimated that the cost of canalization of the Columbia to Priest Rapids and of partial canalization of the Snake to Lewiston, with power plants at each dam, would be $175,000,000. There could be generated almost 1,000,000 primary horsepower at these power plants.

Among the conclusions of the report, of which the first states that canalization only will make the river a factor in the transportation system of the Columbia Basin, and that power development will assist in promoting the growth of contiguous territory, is one recognizing the necessity of having a market for the power developed, and is expressed in this language:

> That a demand for a considerable part of the primary power generated at each improvement project must be in existence before the project is begun by private capital. That this condition can be brought about by locating some industry requiring large quantities of power at or near each dam-site concurrently with the building of the dam or by developing a market within practical transmisison distance of the dam-site.

The stand taken by the report on the question of government ownership is clearly stated in its fifth conclusion as follows:

> That federal, state or municipal ownership and operation of the power plants at the various dams is most undesirable, and that these developments should be carried out by private capital under licenses from the Federal Power Commission, the federal government paying the cost of those structures useful as aids to navigation.

The recommendations in the report are of a general character urging primarily, "the preparation and adoption of a comprehensive plan for such improvements based on principles laid down in our conclusions." The report does, however, endorse the Priest Rapids development, the only one now in contemplation on the upper river, as follows:

> The published statements concerning the plans for the Priest Rapids project, for which federal license has recently been issued, conform with the principles laid down in this report and provide an excellent illustration of the type of development which should be encouraged on the river below.

The greater part of the report is taken up in a presentation of detailed information on which its conclusions and recommendations are based. This material includes a survey of conditions existing on the two rivers, with respect to the characteristics of the different rapids, the distance, the depth and the fall between points, and the government improvements to aid navigation. In addition this portion of the report contains a survey of the commerce developed, the tonnage originating in contiguous territory, landing facilities, rail and highway competition, irrigation projects, power sites and suggested improvements. It also summarizes the Federal Water Power Act, and the report of the Columbia River Board to the Federal Power Commission of 1921.

Fourth Unit Big Creek Power House No. 1 Completed.—Installation of the fourth unit at Big Creek No. 1 power house of the Southern California Edison Company was completed June 8, just thirty days ahead of schedule. With the addition of this 28,000-kv. unit Big Creek No. 1 power house now has a total generating capacity of 73,000 kw. It is of interest to note that the last four sections of pipe for the penstock did not arrive at the job until June 3, yet water was turned through at 8:32 a.m. June 8 and the machine was put on the line at 5:52 p.m. the same day.

Feather River Power Sites Sought.—The Feather River Power Company, San Francisco, has applied to the California Division of Water Rights for permission to divert 105 sec.-ft. of water from Grizzly Creek tributary to the North Fork of the Feather River, Plumas County. It is proposed to develop 29,627 theoretical horsepower. Another application requests 40 sec.ft. from Milk Ranch Creek and three unnamed tributaries of the North Fork of the Feather River, Plumas County, for the development of 11,286 theoretical horsepower. Applications covering these projects also have been filed with the Federal Power Commission.

Great Northern Cascade Grade to Be Electrified

Further electrification of the motive power of the Great Northern Railway was undertaken recently when an order was placed by that company with the Westinghouse Electric & Manufacturing Company for the building of four locomotives. These electric locomotives will be utilized to haul both passenger and freight trains from Skykomish, Wash., to Cascade Tunnel station at the east portal of the three-mile tunnel through the Cascade Mountains, a distance of twenty-four miles.

For twenty-five years trains have been moved through this three-mile tunnel by electric power. The present generating station, located in the Tumwater Canyon of the Wenatchee River, is ample to carry the additional load of the new electrification, hence the only construction involved is that of transmission line, trolley line and the necessary incidentals. The total cost of the job, including locomotives, is expected to be $1,000,000.

One of the unusual features of this installation is the fact that the trolley voltage will be 11,500, single phase, alternating current. This will feed a 1,500-kw. motor-generator set carried on the locomotive and which in turn will supply the four driving motors with energy at 600 volts, direct current. The present four locomotives are operating at 6,600 volts, three phase, alternating current. In order to make these present units available for service when the new system is installed, phase converters will be installed to change the 11,500 volts single phase to 6,600 volts three phase.

A secondary locomotive which takes its driving energy from the main locomotive is used in conjunction with the main locomotive for the purpose of moving heavy freight trains over the 2.2 per cent grades of the Cascades. One of these combined units is capable of moving a 1,500-ton train from Skykomish to Cascade Tunnel station at a speed of nine miles per hour while two of the units can hadle a 3,000-ton train. At present three Mikado-type steam locomotives are required to move a 2,500-ton train over the division. The new electric locomotives will have the same wheel arrangement as the Mikado-type steam units now in use.

The use of electricity on this section of the road will make more attractive one of the most scenic sections of country along the right-of-way. Special open-top observation cars then may be operated without the smoke nuisance incident to the steam locomotives.

Survey of San Rafael River in Utah Is Being Made

A survey of the San Rafael River in Utah, for the land classification branch of the Geological Survey is being made by R. W. Burchard of Washington, D. C., and Ralf R. Woolley of Salt Lake City, U.S.G.S. engineers.

A profile will be run from the forks east of Castle Dale, Utah, and from the lower end of the canyon to join the Green River survey. This is the last survey to determine the possibilities for power and irrigation in the upper Colorado River basin, upon which Mr. Woolley will base his report to the Department of the Interior. Surveys already have been made of the Green River, the Yampa River and the Colorado River.

Governor Pinchot Condemns State Regulation of Utilities

Stating that the control of the "electric monopoly" was the most pressing economic question before the people of the United States, Governor Gifford Pinchot of Pennsylvania, speaking before the Commonwealth Club of San Francisco on July 6, contended that the present system of state regulation of electric utilities was inadequate. Talking principally upon "Giant Power" Governor Pinchot claimed that under the "Giant Power" plan presented in his state, the interstate transmission of electrical energy would be regulated by state regulatory bodies working cooperatively whereas under what he called the "superpower system" state bodies had no control over interstate transmission.

Governor Pinchot is in disagreement with Secretary of Commerce Herbert Hoover's conclusions in his address before the Public Policy Committee meeting at the recent N.E.L.A. convention in regard to the adequacy of the state regulatory bodies. Calling attention to the condition as he sees it in Pennsylvania the speaker stated:

First as to service. Ninety-four per cent of the farms in Pennsylvania are denied public electric service. For more than a year the companies have unitedly opposed our efforts to better this situation. Their influence defeated at the last session of the legislature two bills authorizing farmers to combine and purchase current wholesale from the power companies at cost plus a reasonable profit, putting all the risk and cost of distribution on the farmers themselves.

Second as to discrimination in rates: the Philadelphia Rapid Transit Company in 1922 paid for steam generated electricity an average of 8.3 mills per kilowatt hour. In the same year the average estimated price paid by domestic consumers in Philadelphia was 74 mills or about nine times as much.

As to the fairness of rates as a whole: at present a public service commission cannot decide what is a fair return without first making a valuation of the company's property. And when a valuation is once made it must be made all over again every time the question of a fair return comes up.

It is a very costly procedure. The new York Edison Company has already spent $1,850,000 in preparing for hearings before the Public Service Commission and the total cost to the company alone probably will be $3,000,000, all of which the consumers ultimately have to pay.

Mr. Hoover thinks that regulation as now practiced results in rates that, as a whole, are fair. In proof of this he says that the total of interest and dividends paid in 1924 was only about 6 per cent of the "estimated valuation."

Please note the word "estimated." Against his estimate I set a fact. The Philadelphia News Bureau, published by the same concern that publishes the Wall Street Journal, in its issue of May 27 last, computed the profits of ten companies by the increase in the stock market value of their stocks from the low point of 1924 to that date. After making full deduction for all new stock issued in exchange for new properties it said: "The balance of some $282,000,000 represents the real increase in stock market valuation. amounting to some 180 per cent on the average in less than 18 months." Mr. Hoover talks of 6 per cent a year. The Wall Street Journal's publisher shows us more than 10 per cent a month.

The Pennsylvania electric companies by their united opposition defeated a bill in the Pennsylvania legislature this winter that would have done away with the futile, wasteful, and impossible valuation procedure while guaranteeing to well managed companies a rate of return high enough to attract the vast quantities of new capital needed for expansion.

Third as to financing: The Pennsylvania Public Service Commission has no authority to control security issues, and the electric companies at the last sessoin defeated a bill to give it that authority.

Governor Pinchot's suggestions for supplying adequate regulation where interstate transmission of power is concerned includes the formation of pacts between states whereby they shall cooperatively regulate the utilities. He made no statement as to a plan for the correction of the regulatory body functioning in Pennsylvania.

Postpone Valuation of Property in Los Angeles Area

The valuation hearing scheduled for Jnly 6 on the distribution lines of the Southern California Edison Company in the fourteen newly annexed sections of Los Angeles was postponed until Nov. 2 by the California Railroad Commission. This delay will give engineers for the commission time to establish a true value for the property.

The communities in which Los Angeles has made application to acquire the equipment are: Melrose, Sawtelle, Rimpau, Evans, Ambassador, Laurel Canyon, Hyde Park, Eagle Rock, Vermont, Lankershim, Providencia, Cienega, Annandale, Wagner and Fairfax.

San Francisco Files Petition Asking for Rate Reduction

Reduced rates for electric service are asked in a petition filed by the City of San Francisco with the California State Railroad Commission. Charging that both the Pacific Gas and Electric Company and the Great Western Power Company are earning in excess of the eight per cent prescribed by law, the petition asks for a general rate hearing in San Francisco.

The petition sets forth that in 1922 the revenue of the Pacific Gas and Electric Company was $21,483,700 and in 1924 it was $26,612,088 and that the Great Western Power Company earned $5,330,000 in 1922 and $7,322,562 in 1924. The petition further states that the 1922 revenue represented the allowable eight per cent return but that the 1924 revenue was in excess of that rate.

Denver Electrical League Makes Plans for Coming Year's Activities

No innovations or unusual departures will be injected into the program of the new fiscal year of the Electrical Cooperative League of Denver. After four years of continuous activity, members of the advisory board decided that the fifth year, which started July 1, should conform to the same schedule with a similar appropriation of $13,500 with which to carry on the regular work of the organization.

Plans for the fifth year were completed upon approval of the report submitted by a special program committee which included in its recommendations early consideration of the establishment of the Red Seal activity in Denver and suburban towns, providing conditions were found to be opportune and in harmony with the present system of field work maintained by the league.

More emphasis is to be given social and entertainment features for the benefit of the rank and file of the industry, but not, according to the report, to the extent that a system of social membership will be established inasmuch as the Denver organization has always confined its membership to individuals and firms on a sustaining basis. The first major activity of a social nature will be the league's fifth annual picnic and outing scheduled to be held at Elitch's Gardens, near Denver, Aug. 11.

A number of the board members have expressed themselves as being of the belief that the pioneering period of the league work has passed and that a constitution or more definite set of working rules be established for the future guidance of the league. The original organizers specifically refrained from establising any by-laws at the outset because of changing conditions, it is said.

Continuation of the advisory or consulting service without any let-up was recommended to the organization as was the necessity for close personal interest in the problems of the industry on the part of responsible company executives rather than to delegate matters of this kind to individuals not having the required responsibilities. Attendance at meetings was also stressed in the committee report.

Before the close of the old fiscal year, June 30, over 75 per cent of the budget for the new year was subscribed, according to S. W. Bishop, executive manager of the league, a position which he has held since the organization was formed in 1921.

A. C. Cornell, manager of the Western Electric Company in the Rocky Mountain region, was unanimously elected chairman of the new board which took office July 1. Vice-chairmen designated thus far are Ernest P. Kipp, western sales manager of the Hazard Manufacturing Company for the manufacturers and A. E. Bacon, manager of the electrical department of the Mine & Smelter Supply Company, for the jobbers. E. A. Scott of Scott Brothers Electric Company, was re-elected secretary. Dean D. Clark, Denver commercial manager of the Mountain States Telephone & Telegraph Company, again was named treasurer.

The advisory board members designated by the respective divisions to serve for the new year are:

Manufacturers—Ernest P. Kipp, western sales manager, Hazard Manufacturing Company; Robert Miller, district manager, General Electric Company; L. M. Cargo, district manager, Westinghouse Electric & Manufacturing Company; K. L. Francis, president and general manager, Albert Sechrist Manufacturing Company; and Fred E. Staible, president, Wesco Supply Company.

Jobbers—A. C. Cornell, Rocky Mountain manager, Western Electric Company, Inc.; J. C. Davidson, manager, electrical department, Hendrie & Bolthoff Maufacturing & Supply Company; A. E. Bacon, manager, electrical department, Mine & Smelter Supply Company; John J. Cooper, manager, Mountain Electric Company, and B. C. Watts, president, B. C. Watts & Company.

Contractor-Dealers—W. A. Guscott, E. C. Headrick, E. A. Scott, D. D. Sturgeon, and W. R. Kaffer of the Electrical Supply & Construction Company.

Public Utilities—O. L. Mackell, G. B. Buck, Clarence Keeler, F. F. McCammon, and R. G. Gentry, all of the Public Service Company of Colorado and Dean D. Clark, Denver commercial manager, Mountain States Telephone & Telegraph Company.

The annual report of the league covering activities of the past year and plans for the new one, is now on the press and will be distributed shortly. Copies will be mailed to anyone that is interested. One of the interesting features of the financial end of the report is the balance of over $500 resulting from economies of operation not contemplated in the original budget.

Information Concerning Appliances Is Contained in New Hand Book

A 30-page hand book, known as the "Hand Book of Electric Appliance Information" to be placed in the hands of all in the electrical industry that come in contact with the public, has been issued by the California Electrical Bureau. The book contains useful information dealing with the operation, care, adaptability and cost of operation of all classes of appliances. Home lighting also is discussed at some length.

The text of the booklet, which is written so that the layman can understand it easily, starts with a description of the uses of the convenience outlet, and shows how with the use of this device electrical appliances may be used more easily. The common electrical terms are explained in language that may be understood by the average housewife. This explanation naturally leads into a description of the methods of metering the current used in the home. Meter reading is explained, as well as the process of figuring monthly bills for service.

Several paragraphs are devoted to instructions concerning the general care of electrical appliances.

In discussing the appliances used in the modern home these devices are grouped according to their useage. Those taken up first are table appliances. The advantages of each of five classes are presented together with a description of the various types that are now on the market. The average cost of operating the appliances is presented also. Under kitchen appliances the book presents the best selling points of the electric range, water heater, dish washer, hot plate, cream whipper, utility motor, ventilating fan, ice cream freezer and refrigerator. The time and labor saved the housewife together with average costs for operation are incorporated in the descriptions of these appliances. The clothes washer, ironing machine and electric iron, which are classed as laundry appliances are discussed in much the same manner. General household and miscellaneous appliances are described and their advantages portrayed in the next section of the hand book. Considerable attention is paid to electric fans and air heaters, the various types of the latter being discussed at some length.

"Proper lighting," says the hand book, "is the concern of everyone that lives in a home." To assist in placing better lighting in the home eight pages of the book have been devoted to this important subject. Gloom and glare are defined and then each room of the house is taken and suggestions made as to the proper method of illuminating it for the benefit of the entire family. Wattages of lamps in various fixtures are recommended as well as total wattages for every room.

While the hand book has been prepared primarily to assist the salesman of leaders (both electrical and non-electrical), jobbers and central stations, is suited to distribution among the general public. The hand book was prepared by a committee headed by P. H. Booth.

Copies of the book have been placed in the hands of all dealers, jobbers and managers of central station company commercial departments for distribution to their salesmen. Additional copies may be obtained prior to July 31 at a cost of 10 cents each, by addressing the California Electrical Bureau, 447 Sutter Street, San Francisco.

Rebuilding of Santa Barbara Is Being Accomplished

Splendid progress in the task of removing every trace of the devastating earthquake which killed fourteen persons and caused a property loss of approximately $13,000,000 in Santa Barbara, Calif., between 6 and 10:30 a.m., June 29. Dust from the falling buildings had hardly settled before steps had been taken by various California civic organizations together with banking institutions to finance the rebuilding of the city.

Actual damage was confined almost entirely to the business district of the city, the residential section comparatively suffering very little. Danger of fire from short circuits made it necessary to prohibit the use of electricity in the stricken city until a thorough inspection had been made in all houses, but street lights in the business area were on at 7 p.m. the day of the shock. Emergency service to the two newspapers, one hospital, and one ice plant was available within a few hours after the quake. Broken gas mains made it impossible to do any cooking except such as could be done over open fire built on the lawns.

Although the dam impounding Sheffield reservoir, one of Santa Barbara's main water supplies, went out in the quake, the water was bypassed from the tunnel above the reservoir and the city water system is now back to normal. No fires of any consequence were caused by the tremor.

According to official estimates, the Southern California Edison Company which serves Santa Barbara with electricity sustained a loss of approximately $15,000. The Santa Barbara substation building which the company had planned to wreck in 1926 and replace with a modern station was destroyed completely. All of the equipment of this station was of the out-of-doors type with the exception of the motor-generator sets used to furnish power for the street railway. Aside from the breaking of a bushing on one of the transformers and the slight displacement of another, this out-door equipment escaped injury. Temporary switches were erected back of the outdoor substation and new feeder lines connected to the distributing circuits which were not damaged anywhere in town. Within the building, the motor generator sets received a shower of mortar and bricks but were found to be unharmed and ready for use after overhanging walls had been demolished.

Profiting by the work done for them by the earthquake in wrecking the old building, officials of the company decided to advance the date for starting the work on the new substation about one year, and the necessary appropriation of a quarter of a million dollars was authorized immediately. An emergency crew of more than one hundred men was sent to Santa Barbara and excavation work on the new site which the company had previously purchased at the corner of Gutierrez and Quarantina Streets was started at once.

The substation being built will not only be the terminal of the 60,000-volt lines from Saticoy Substation, but will likewise be the distributing point for all light and power circuits supplying the city and its environs. The station will have a 60,000/10,000/4,000-volt transforming capacity and both building and equipment will be of the most modern design and type.

The Santa Barbara & Suburban Railway, a subsidiary of the Southern California Edison Company, suffered slight damage and service was restored July 4. It was necessary to set 75 poles on State Street to support the overhead trolleys which were formerly supported by buildings damaged by the earthquake.

Reports from the Montana Power Company state that in the recent tremors felt there no appreciable damage was done to its properties. A few poles fell due to the shock.

New Line of Lamps Announced by Mazda Manufacturers

The Mazda lamp manufacturers have announced the first unit of a new line of Mazda lamps. The principal feature of this new line of lamps is the inside frosting of the bulb which leaves the exterior surface smooth so that it will not collect dust or dirt. The inside frost is an excellent diffuser yet absorbs little more than a clear lamp. For years lamp manufacturers have tried to produce lamps with a frosting inside the bulb but always have been unsuccessful until the recent discovery by research engineers.

As the new line of lamps will replace both round and straight side bulbs, a composite bulb, pear-shaped, has been adopted. Due to improvement in the filament and other features of construction, the lamp is more rugged than previous lamps for general lighting service. The new line represents not only better light for less money to the public, but also embodies a program of standardization whereby the new lamps in possibly five sizes eventually may replace more than forty various types and sizes of present lamps.

Index to Volume 54 Ready for Distribution.—Index to Volume 54 of the Journal of Electricity, covering issues from Jan. 1, 1925, to June 15, 1925, has been published and is ready for distribution. Copies of the Index will be mailed to any subscriber of the Journal of Electricity upon application to Circulation Manager, Journal of Electricity,, 883 Mission Street, San Francisco.

Power Site on Clearwater River in Idaho Sought.—The Inland Power & Light Company has applied to the Federal Power Commission for a preliminary permit covering a project on the Clearwater River in Nez Perce County, near Lewiston, Idaho. The dam is to be located two miles above Lewiston and the power house is to be on Clearwater Slough. This application conflicts with one of the city of Lewiston, filed Dec. 17, 1924. It is understood that the city will cancel its application due to recent agreements. (Journal of Electricity, April 15, 1925, p. 297.) The Inland company is affiliated with the Pacific Power & Light Company of Portland.

News of the Electragists

Reception committee of the San Diego Electragists which met the delegates at the boat and transported them to the hotel

Divisional Meeting of Electragists at San Diego Successful

Practical problems facing the contractor-dealer members of the electrical industry including merchandising and contracting, with special emphasis on the Red Seal Plan were among the subjects discussed at the first quarterly meeting of the California Electragists, Southern Division, which was held at the Hotel Maryland, San Diego, on June 27. The S.S. Ruth Alexander carried 165 delegates and their wives and friends from Los Angeles harbor to San Diego. A number also made the trip by automobile.

The delegates were entertained with sight seeing trips, golf, a box lunch, baseball games between the jobbers and manufacturers and the electragists, and an organ recital. In the evening a banquet and dancing was enjoyed at the hotel.

Merchandising Session

The merchandising session was held in the morning and was presided over by O. N. Robertson, Robertson Electric Company, Santa Ana.

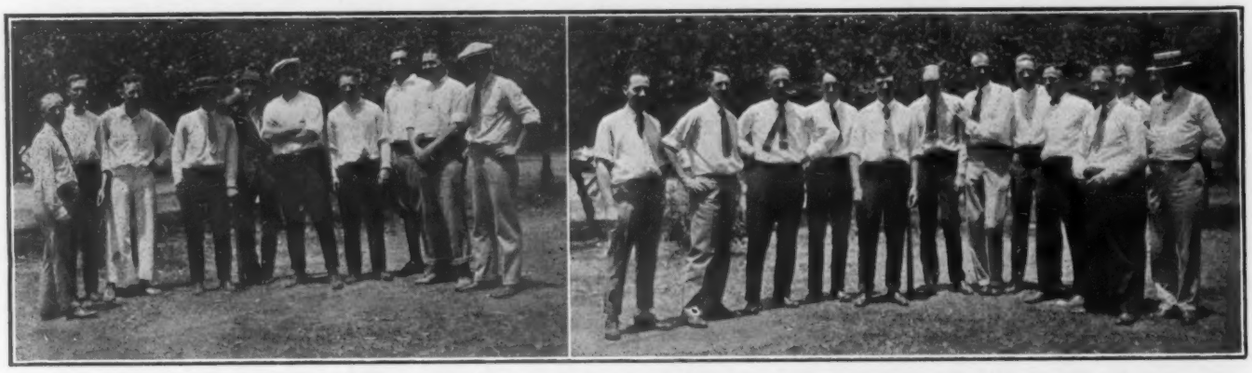
A. M. Fitch of the Harrison-Fitch Electric Company, Pomona, presented a paper on the electrical contractor-dealer with respect to merchandising problems of today. He stated the large amount of business being diverted to the hardware, department, and specialty stores presented a problem which demanded the best thought and cooperation of all interested parties if the contractor-dealer as now organized was to survive. As it is a rare man who makes a good merchant and a good contractor, he said it is usually advisable for a contractor-dealer to handle the particular phase of the business for which he is best qualified and to associate someone with him to handle the other branch. The subjects of credit and time-payment plans were discussed as well as the addition of other lines of merchandise. Mr. Fitch stressed the importance of friends as a permanent asset in receiving repeat orders and recommendations to others.

D. D. McFarlane, Newbery Electric Corporation, Los Angeles, stated that contracting and merchandising should be treated as two separate departments of the business. He spoke of the importance of proper display and the correctness of statements regarding the operation of various machines. He stated in their business direct mail advertising had been substituted for house-to-house canvassing.

H. B. Harris, Listenwalter & Gough, Los Angeles, presented a paper on the problems facing the contractor-dealer. He asserted that the contractor-dealer was the logical outlet through which the buying public should be served. As the contractor-dealer has the first contact with the ultimate purchaser of household devices, Mr. Harris said that a client for his business is created if the contractor conducts himself properly when making the installation in the building. He stated the time-payment plan was good business from the standpoint of clientele-building in that the frequent contact presents an opportunity to acquaint the customer with the many facilities of the contractor-dealer for serving him. He said great care must be used in the selection of reliable merchandise.

A. E. Holloway, San Diego Consolidated Gas & Electric Company, presented a paper on the contractor-dealer. He first discussed the subject from the contractor's standpoint. Mr. Holloway stated that inadequate wiring is usually specified because of the lack of consultation with any electrical man before the time of calling for bids. In his opinion the big problem facing the contractors is the building up of the job while it is in the formative stage as extra outlets, switches, etc., added at that time change the job from an unprofitable one to a profitable one. He urged that greater effort and better salesmanship should be expended in closing wiring jobs.

Taking up the dealers' problem, Mr. Holloway first discussed the necessity of selling proper lighting equipment instead of merely a fixture, and spoke of the opportunity of selling appliances to a customer at the time of selling lighting fixtures. In speaking of the problem of central stations merchandising electrical appliances, Mr. Holloway said, "It seems that throughout the East and Middle West, the central stations are all going into the merchandising business, and reports come from the dealers and central stations, that the dealer is doing a better business with the central station on the job than when the central station was not merchandising. I can see where such might be the case if the central station went into the appli-



Left, Electragists baseball team; right, jobbers and manufacturers team. After a hotly contested game, the jobbers and manufacturers were declared to be the winners

ance business on a legitimate scale and acted as a balance or stabilizer for prices, combined its advertising along proper lines and cooperated with the other dealers in the community. If a central station goes into the appliance business and operates along legitimate lines, I can see where there is opportunity for greater volume of business for everyone."

The following committee of five was appointed to make a study of the problem of merchandising electrical appliances: C. A. Rowley, The McNally Company, Pasadena, chairman; Carl Heilbron, Southern Electrical Company, San Diego; J. J. Farley, J. J. Farley Electric Company, Fullerton; D. D. MacFarlan, Newbery Electric Corporation, Los Angeles; and A. M. Fitch, Harrison-Fitch Electric Company, Pomona.

Frank McGinley, Harbor Electrical Company, ready for action

Umpire W. L. Frost, Southern California Edison Company, calls a strike

O. N. Robertson, Robertson Electric Company, Santa Ana, was elected chairman of the merchandising section of the California Electragists, Southern Division, for the ensuing year.

Regular Session

Vice-President Frank McGinley, Harbor Electrical Company, Wilmington, presided over the regular session which was held in the afternoon. Executive Secretary C. J. Geisbush gave his report in which he outlined the history of the organization. He said the work up to the present time had been concentrated on the education of the members teaching them the electragists system of estimating. The next large job to be undertaken is the Red Seal campaign.

A committee was appointed to draw up a resolution commending Harry Walker, H. H. Walker Company, Los Angeles, and Clyde Chamblin, California Electrical Construction Company, San Francisco, for their unselfish service in the interests of the California Electragists.

Harry Harper, Western Electric Company, Los Angeles, next addressed the members. He stated there was plenty of business for everyone and the people would be served, but the question was whether or not a profit would be made by those handling the business. He asserted that the jobbers in Los Angeles felt that the contractors had adopted a practical plan or organization.

Red Seal Plan Discussed

Mr. Harper also discussed the Red Seal Plan, which is a program to promote adequate wiring for convenient electric service in the home. It will be administered from the Society for Electrical Development by the California Electrical Bureau through the California Electragists. The three main elements of the plan consist of the establishment of minimum requirements as to adequacy, in terms of lighting, switch and convenience outlets, special circuits, etc.; identification of the homes which at least satisfy the minimum requirements by means of the Red Seal emblem; and the popularizing of the Red Seal emblem as the symbol of adequate wiring.

W. L. Frost of the Southern California Edison Company, Los Angeles,

Too many hands caused trouble

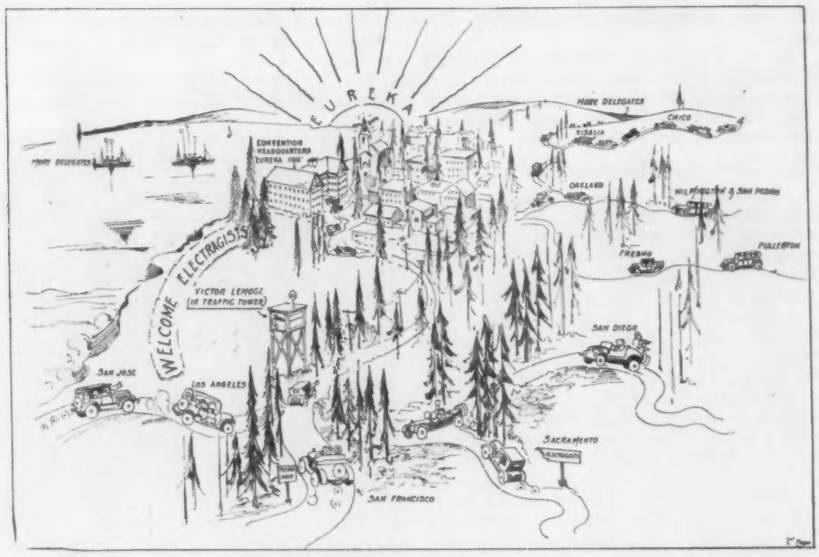
stated that the California Electrical Bureau had been reorganized and would work with the California Electragists.

H. E. Sherman, Jr., Illinois Electric Company, Los Angeles, addressed the meeting on the subject of confidence. He stated the problems of the electragists called for good sound thinking and a lot of hard work. He spoke of the place of confidence in association activities and pointed out some of the pitfalls which must be avoided in any successful organization.

A communication was read from Victor Lemoge, president of the California Electragists, asking for a nomination from the Southern Division for the presidency of the California Electragists. Harry Walker, H. H. Walker Company, Los Angeles, was unanimously nominated.

The success of the convention can be largely attributed to the untiring efforts of J. F. Zwiener, Fred L. Edwards, Mrs. Walter C. Wurfel, and C. J. Geisbush.

Left, H. E. Sherman, Illinois Electric Company, captain of the jobbers and manufacturers baseball team, and C. J. Geisbush, California Electragists, exchanging greetings with the loving cups awarded them



An artist's conception of the heavy traffic which will be caused by the arrival of delegates to the Electragists convention at Eureka, August 6-8

California Electragists Plan Interesting Meeting

Reservations are being received daily for the annual convention of the California Electragists, Northern Division, which is to be held at Eureka, August 6-8, according to Victor Lemoge, president. They must be made through the San Francisco office at 522 Call Building, and must be accompanied with the registration fee of $5 per person.

The program which has been planned includes the general open meeting, an auto tour up the coast for the ladies, a day in the logging woods with a trip to the electric mills, golf, a baseball game between the jobbers and manufacturers and the electragists, a banquet and dancing. Complete details were given on page 37 of the July 1 issue of the Journal of Electricity.

Seattle Electrical Code to Be Redrafted Immediately

Seattle is to have a new electrical code to replace the existing code which is obsolete in many respects. The council recently approved a request of the building department for authority to redraft the code, and plans have been completed for such work. Robert Proctor, city superintendent of buildings, states that the committee which he has appointed will strive for the maximum of safety at a minimum of cost to the builder, in preparing the new code, which will require about three months time to complete.

The following committee has been named: J. G. Maitland, representing the Electric Club, chairman; M. P. Hotelling, building department, secretary; A. H. Patton, Washington Surveying & Rating Bureau; T. W. Stevens, city lighting department; A. N. Potter, Building Owners' & Managers' Association; J. R. Jewett, I. B. Electrical Workers No. 46; M. T. Crawford and L. O. Snow, Puget Sound Power & Light Company; R. L. Laing, city fire marshal; Robert Proctor, city building superintendent; A. Nicholson, W. C. Clothier and E. Morrison of the city building department.

Electrical Development Society Directors Appointed

Directors of The Society for Electrical Development appointed at a recent meeting of the board of directors to serve for one year each comprised the following:

Representing central stations—H. A. Wagner, president Consolidated Gas & Electric Light & Power Company of Baltimore, Baltimore, Md.

Representing manufacturers—H. B. Crouse, president and treasurer Crouse Hinds Company, Syracuse, N. Y., and Herman Plaut, president L. Plaut & Company, New York City.

Representing jobbers—W. I. Bickford, secretary-treasurer Iron City Electric Company, Pittsburgh, Pa., and N. G. Harvey, president Illinois Electric Company, Chicago.

Representing contractor-dealers — C. L. Chamblin, president California Electrical Construction Company, San Francisco, and W. A. Jackson, president W. A. Jackson Company, Chicago.

Representing at-large group—J. R. Crouse, Crouse, Tremaine Kulas Company, Cleveland; H. L. Doherty, president Henry L. Doherty & Company, New York City; C. W. Price, chairman of board of directors, International Trade Press, New York City; E. W. Rockafellow, vice-president National Pole Company, New York; C. A. Ward, president Ward Motor Vehicle Company, Mt. Vernon, N. Y., and James H. McGraw, president McGraw-Hill Company, Inc., New York City.

L. A. G. and E. Plans Extension Program.—The Los Angeles Gas and Electric Corporation expects to spend approximately $8,000,000 on additions to its generating, transmission and distribution systems during the balance of the year. One-half of this sum is to be expended on the new Seal Beach station, together with necessary substations and transmission lines to handle the additional power generated. The balance of the money is to go toward general extensions to the distribution system, including the purchase of 24,800 meters.

Book Reviews

ELECTRIC RAILWAY TRANSPORTATION

By HENRY W. BLAKE and WALTER JOHNSON

449 pages, 121 figures. $5. McGraw-Hill Book Company, Inc., New York, N. Y.

Books concerning the transportation methods, practices, and problems of electric railways are comparatively scarce. Electric railway engineering has been treated in a number of text books, but the purely transportation phase of this most important public utility has had very little treatment in book form. The author points out that the number of men engaged in the transportation department of an electric railway greatly exceed in number those in the engineering department and that there is a possibility for greater financial loss through faulty practice.

This book, originally published in 1917, has been revised in the edition of 1924 to include material covering the problems of bus operation by electric railways; the use of the Birney one-man car; organized safety methods, and the problems arising as a result of the present day necessity of applying merchandising methods to all electric railway transportation.

The book begins with chapters on the subject of "Organization;" "Adjustment of Service to Traffic;" a chapter covering "Accelerating Traffic Movement Along the Lines and on the Car." Then follow three chapters devoted to "Car Types in Relation to Traffic;" "City Time Tables;" "Interurban Schedules and Dispatching;" "Fares, Fare Collection Practice and Devices" are then treated followed by chapters on "Public Relations and Promotion of Passenger Traffic."

This last phase of the work is treated in great detail in a chapter covering "Traffic Signs for Cars," "Station and Road,'" methods of furnishing information for the public. The latest innovation and addition to the electric railway, and one which is given more prominence daily is covered in the chapter entitled "Motor Bus Operation by Electric Railways."

The book concludes with five chapters dealing with the personnel of electric railway operatives under the head of "Selection and Training of Men," "Wages and Wage Agreements," "Employee Relations," "Discipline of Trainmen" and "Forms of Extra Pay."

The author states plainly that the book is intended in no way to be a compilation of the practice of all companies on the various subjects treated. References are made to European tramway practice relating to the period before the World War.

This book treats the subject of Electric Railway Transportation in a very thorough manner and should prove most valuable for executives and engineers having charge of electrical railway transportation systems.

E. R. S.

Meetings

Portland N.E.L.A. and A.I.E.E. Elect New Officers

At a recent meeting of the Portland sections of the N.E.L.A. and A.I.E.E., held May 20, officers of both sections were elected for the coming year. In the N.E.L.A. section new officers are as follows: chairman—W. W. Sansom, office manager, commercial department, Portland Electric Power Company; vice-chairman—D. F. McCurrach, rate engineer, Northwestern Electric Company; secretary—V. H. Moon, appliance sales superintendent, Pacific Power & Light Company; treasurer—J. C. Plankinton, sales manager, Northwestern Electric Company. Two new members of the executive committee were chosen as follows: E. R. Nigh, superintendent of distribution, southern district, Puget Sound Power & Light Company; and R. J. Cobban, Westinghouse Electric & Manufacturing Company.

In the A.I.E.E. section the following are the new officers and members of the executive committee: chairman—Lindsley W. Ross, transmission engineer, Pacific Telephone & Telegraph Company; secretary and treasurer—J. C. Henkle, foreman of inside construction, Portland Electric Power Company; executive committee—L. M. Moyer, engineering department, General Electric Company, and L. W. Going, city electrical inspector, Portland.

Dinner Tendered Eureka Cleaner Sales Force at Spokane

A group of district managers and salesmen of the Eureka Vacuum Cleaner Company, together with representatives of The Washington Water Power Company, Spokane, local retailers of the Eureka company's products, recently was tendered a dinner at the Davenport Hotel in that city by A. J. McCarthy, vice-president and general manager of the sales of the Eureka Vacuum Cleaner Company, Detroit. R. B. Carter, in charge of sales for the Eureka company in Spokane territory, presided.

Mr. McCarthy addressed the gathering upon the operation of his company, touching briefly upon its growth in business, the growing market for cleaners, and the sales methods advocated by the company. In conclusion two motion pictures were presented, one showing the 1924 meeting of the Eureka branch managers in Detroit, and the other an advertising comedy, "Sign Here." Among the guests were J. E. E. Royer, assistant general manager, Lewis A. Lewis, sales manager, and R. B. McElroy, assistant sales manager, all of The Washington Water Power Company.

Electric Club Stages Successful Social Event.—The Electric Club of San Diego, Calif., recently paid a visit to the new Mission Beach amusement center. During the evening a dinner dance was held in the new casino and dance pavilion. There were more than fifty couples present to enjoy the dinner and the evening of dancing and cards.

Electrical Industry in San Francisco Hears Red Seal Plan Discussed

A meeting which was attended by 250 members of the electrical industry was held in the auditorium of the Pacific Gas and Electric Company, July 2, under the auspices of the California Electrical Bureau. R. E. Fisher, chairman of the advisory committee of the bureau, called the meeting to order and then introduced C. T. Hutchinson, chairman of the evening.

Fred M. Feiker, operating vice-president of the Society for Electrical Development, Inc., addressed the meeting on the Red Seal Plan. He first spoke of the problem facing the electrical industry as being that of the cost of distribution, which can be solved only by individual effort coupled with associated group effort. He stated that the Society for Electrical Development provides machinery to put into operation the programs outlined by the ten national associations in the industry. In speaking of the Red Seal Plan, Mr. Feiker said in part: "Competition in the wiring of new homes has for years been degenerating into a more or less general form of cutting down the job. The speculative builder has not been subjected to the pressure of demand by the buyer, the consequence of a general lack of understanding by the public of the importance of having a complete wiring installation. The responsible electrical contractor has been driven from the new residence wiring field, and the industry has had little or no control of the situation from the standpoint of adequacy.

Elements of the Red Seal Plan

"To combat this condition in a cooperative way there first came the electric home, which has demonstrated its ability to arouse public interest in the matter. The Red Seal Plan crystalizes the message of the electric home, and constitutes its most logical follow-up. The public is given a minimum standard, plus a means for identifying the home which is adequately wired.

"There are three main elements in the plan: 1. Establishing local minimum requirements as to adequacy, in terms of lighting, switch and convenience outlets, special and spare circuits, capacity of main service, etc. 2. Identification by means of the Red Seal emblem of the houses which at least satisfy the minimum requirements. 3. Popularizing the Red Seal emblem as the symbol of adequate wiring and creating a demand for Red Seal electric homes.

"In California the plan will be administered for the Society for Electrical Development by the California Electrical Bureau through the California Electragists."

Earl Whithorne, commercial editor, Electrical World, gave a resume of the development of commercial activities in the electrical industry. He also outlined the progress which has been made in the electragist movement. The two major issues before the industry at present, as given by Mr. Whitehorne, are the devolpment of local cooperation and of the contracting branch of the business. He stated that the electragist movement had been developed from the former contractors' association and had been built up by the contractors.

A. M. Frost, commercial manager of the San Joaquin Light & Power Corporation, Fresno, discussed the sales problem of that company.

Central Station Sales Program

Hugh Crawford, general sales manager, Pacific Gas and Electric Company, outlined the $5,000,000 sales program of that company and the Great Western Power Company. This program embodies a full measure of cooperation with the contractor-dealer and the merchandiser. Complete details of this plan were given on page 33 of the July 1 issue of the Journal of Electricity.

Clyde L. Chamblin, California Electrical Construction Company, San Francisco, gave some interesting information regarding the California Electragists. He stated that the membership of the organization included some 400, which is the largest enrollment in the Association of Electragists, International, in any state in the Union. In speaking of the employment of the California Electragists by the California Electrical Bureau to execute the Red Seal Plan, he said the electragists were determined to carry out the program successfully, but that it was essential that they receive the wholehearted support of every other branch of the industry in the work. Mr. Chamblin strongly urged that everyone give members of the Electragists' organization consideration and support when placing business.

P.C.E.A. Section Chairmen Are Appointed for 1925-26

Chairmen of the various sections of the P.C.E.A. for the coming year have been appointed by William Baurhyte, president of the organization. Section members will be appointed by the chairmen and will be announced in the Journal of Electricity as soon as possible.

The men appointed by President Baurhyte to fill the positions during the coming year are as follows:

Public Relations Section, A. B. West, The Southern Sierras Power Company. Public Policy Section, R. H. Ballard, Southern California Edison Company. Commercial Section, H. M. Crawford, Pacific Gas and Electric Company. Technical Section, R. R. Cowles, Pacific Gas and Electric Company. Accounting Section, B. B. Stith, Western States Gas & Electric Company. Purchasing and Stores Section, F. W. Smith, Great Western Power Company. Publicity Section, D. L. Scott, Los Angeles Gas and Electric Corporation. Insurance Committee, Herbert Dewes, The Southern Sierras Power Company. Transportation Committee, S. B. Shaw, Pacific Gas and Electric Company. Membership Committee, S. H. Taylor, Pacific Coast Electrical Association.

In appointing the section chairmen President Baurhyte, as far as was possible, named the vice-chairmen of last year's sections as chairmen for the coming year. Chairmen have been requested to appoint their fellow members as soon as possible, remembering that only members of the P.C.E.A. that are eligible to membership in the N.E.L.A. are eligible to committee appointment.

Personals

Clyde Chamblin, president, California Electrical Construction Company, San Francisco, was elected to the executive committee of the National Electric Light Association at its recent convention in San Francisco as a member at large to represent the electragists. He succeeds James R. Strong. As the representative of the electragists, Mr. Chamblin will voice the problems of that group to the leaders of the national organization with a view toward effecting the highest degree of cooperation and co-ordination between those two branches of the industry. Mr. Chamblin is particularly well fitted to act in that capacity because of his knowledge of the affairs of the electragist branch of the industry, his long experience, and his active participation in matters electrical. For the past three years he has been a member of the executive committee, Association of Electragists, International, and a director of the Society for Electrical Development, Inc., for the same length of time. He is a member of the advisory committee of the California Electrical Bureau and a member of the executive committee, San Francisco Association of Electrical Contractors and Dealers, of which he is past president. He is also a past president of the California State Association of Electrical Contractors and Dealers. In addition, he was formerly president of the San Francisco Electrical Development League and a member of the executive committee of the Pacific Coast Electrical Association. Mr. Chamblin is also prominent in the affairs of the Rotary Club of San Francisco.

CLYDE L. CHAMBLIN

J. F. Lincoln, vice-president of the Lincoln Electric Company, Cleveland, Ohio, recently left for a business trip to England. During his stay there he will visit the main industrial centers and make a study of export possibilities.

G. A. Hill has been appointed to take charge of the Wisconsin territory of the Curtis Lighting, Inc., Chicago, succeeding **J. M. Weimer,** who has been transferred to the Chicago office. Mr. Hill will be located at 506 Mayer Building, Milwaukee, Wis.

T. W. Nixon, formerly with the Westinghouse Lamp Company and at one time secretary of the Milwaukee electrical contractors, has been appointed secretary and field man of the Denver Electrical Contractors' Association, Inc.

H. G. Reid has moved his shop from 1643 Tremont Place to 1716 Broadway, Denver, Colo.

George Thompson, formerly of the appliance sales department of the San Francisco office of the Western Electric Company, recently was transferred to the sales department of the company's Oakland office. **E. A. Crowson,** who has been connected with the Oakland sales department, has been transferred to the San Francisco department.

H. L. Melvin, of the Engineering Department of the Electric Bond & Share Company, New York spent some time in Spokane recently enroute to Lewiston, Idaho, where he visited his former associates of The Washington Water Power Company of which he was formerly electrical engineer.

D. E. Harris, vice-president, Pacific States Electric Company, San Francisco, recently left on an extended Eastern tour.

J. B. Naugle, Naugle Pole & Tie Company, Chicago, recently visited the west coast in the interests of his firm, during which time he established a west coast sales office at Spokane, which is one of the producing centers of his company.

G. M. Wills, general superintendent, and **Verne Johnson,** superintendent of the San Bernardino steam plant of The Southern Sierras Power Company, Riverside, Calif., recently were visitors to San Diego, conferring with members of the San Diego utility company.

E. E. Scofield, assistant industrial engineer, The Washington Water Power Company, Spokane, visited Nelson, B. C., recently and inspected the hydroelectric plants of the West Kootenay Power & Light Company and of the city of Nelson, located on the Kootenay River.

E. S. Mathews, sales manager of the Electro-Kold Corporation, Spokane, spent a few days in Portland recently for the purpose of establishing a representative in that city to promote the sale of the electric home refrigerator manufactured by his company. From Portland his itinerary took him to California cities where new representatives recently have been established.

G. A. Hughes, vice-president and sales manager, Edison Electric Appliance Company, Inc., Chicago, visited Spokane lately, while enroute from the East to San Francisco. He was met in Spokane by **Ray W. Turnbull,** assistant Pacific Coast sales manager of Portland, who accompanied Mr. Hughes to San Francisco.

A. H. Crowell, formerly with the Washington Electric Supply Company, Spokane, has opened an electric shop at Roseburg, Ore.

R. M. Alvord and **Morris Hixon,** both of the General Electric Company's San Francisco office, shortly departed on a trip to the company's headquarters at Schenectady, N. Y.

C. D. Walcott, noted scientist with the Smithsonian Institution, Washington, D. C., was a recent visitor in San Francisco en route to Canada.

Robert Vogler, local agent, The Washington Water Power Company, Omak, Wash., attended the recent Moose convention in Spokane.

J. P. Surratt recently has become associated with the Salt River Valley Water Users Association, with headquarters in Phoenix, Ariz.

A. E. Rowe, of Garnett Young & Company, San Francisco, has been appointed a member of the newly organized Better Bushiness Bureau of the San Francisco Advertising Club.

Prof. Elihu Thomson, one of the founders of the General Electric Company and director of the company's research laboratory at Lynn, Mass., recently was awarded the Franklin Medal and a certificate of honorary membership in the Franklin Institute at Philadelphia. The medal was awarded "in recognition of his pioneer work in the fields of electricity and electrical engineering and of his numerous inventions in the fields." Professor Thomson has been granted more than six hundred patents, and his inventions in electric machinery, electric welding, watt-hour meters, lightning arresters and magnetic arc extinguishers are fundamental. He was the first to use oil as an insulating material in transformers, and the first to make the high-tension alternating-current system safe by introducing the practice of grounding the secondaries of transformers and distributing circuits. He made the first very high frequency dynamo in 1890; he also made the first high-frequency transformer and developed apparatus which afterward was utilized in wireless telephone and telegraph work. He was the first to make stereoscopic X-Ray pictures. Born in England, Professor Thomson came to America with his parents at the age of 5 years. After a period of teaching in the Central High School of Philadelphia, he became the technical head of the American Electric Company, New Britain, Conn., established on the foundation of his inventions. This company later was reorganized on a larger scale, moved to Lynn, Mass., and renamed the Thomson-Houston Electric Company, which in 1892 was merged with the Edison General Electric Company into the present General Electric Company. Professor Thomson is a past president of the American Institute of Electrical Engineers and of the Massachusetts Institute of Technology. He is a member of various American and British scientific and professional societies, and the recipient of numerous honors, among them the Rumford, Edison, Elliott Cresson, John Fritz, Hughes and Kelvin Medals.

PROF. ELIHU THOMSON

J. M. Laflin, for the past three years chief clerk at Walla Walla, Wash., for the Pacific Power & Light Company, Portland, was promoted on May 1, 1925, to be field auditor with headquarters at Walla Walla. Mr. Laflin was born in Ohio in 1876, and after graduating from business college at Zanesville, Ohio, at the age of twenty, entered the public-utility field with the Peoples Gas Light & Coke Company, Chicago. He remained there as bookkeeper and storekeeper until 1902, except for eight months with the Laclede Gas Company, St. Louis, and in that year went to Seattle and entered the employ of the Seattle Gas & Electric Company. In

J. M. LAFLIN

1904, after a second short period with the Laclede Gas Company, St. Louis, he returned to the West, taking a position with the Portland Gas & Coke Company. The years 1905 to 1908 found him employed in turn by the Lowman & Hanford Company, Seattle, wholesale and retail stationers in that city, and by the Seattle Lighting Company. He spent two years with the Spokane Falls Gas Light Company, Spokane, returning to the Lowman & Hanford Company, Seattle, again in 1910. In 1913 he bought the Northwestern Credit Association, which he sold in 1917, and after a few months with the Bisbee Improvement Company, Bisbee, Ariz., he returned to the Northwest and entered the employ of the Pacific Power & Light Company. In November, 1918, he was sent as chief clerk to Astoria, Ore., remaining there until his transfer to Walla Walla in 1922.

W. F. Price, formerly secretary of the California State Association of Electrical Contractors and Dealers and prior to that, field man of the California Electrical Bureau, has become associated with the San Francisco office of the Arrow Electric Company.

Oscar Agazelow, for the past five years representative of the stock sales department of the Great Western Power Company, San Francisco, has been appointed honorary consul for Oregon and Washington, representing the republic of Nicaragua, Central America.

James D. Sparks, formerly of Landers, Frary & Clark, New Britain, Conn., has been appointed Northwestern sales representative of the Majestic Electric Appliance Company, Inc., with headquarters at Seattle.

Garnett Young, president, Garnett Young & Company, San Francisco, shortly returned from an extended Eastern trip.

E. C. Hutchinson, vice-president and general manager, Pelton Water Wheel Company, San Francisco, recently sailed for Alaska to be gone about a month.

W. R. Lyall, formerly with the D. & W. Fuse Division of the General Electric Company, Bridgeport, Conn., recently has become affiliated with the Majestic Electric Appliance Company, Inc., as salesman in the San Francisco territory.

D. H. Braymer, formerly editorial director of Industrial Engineer, with headquarters in Chicago, has resigned to devote the major part of his time to the activities of the recently organized D. H. Braymer Equipment Company, which will specialize in consulting and sales work associated with power applications in industrial plants, large buildings and power plants. The new concern will have headquarters in Omaha, Neb., and **Marvin Phillips** will be associated with Mr. Braymer as installation engineer. Mr. Braymer will retain his connection with the McGraw-Hill Company as consulting editor of Industrial Engineer.

A. L. McCarthy, vice-president and general manager of sales, Eureka Vacuum Cleaner Company, Detroit, was the honor guest at a banquet given recently at the Olympic Hotel, Seattle, by the Poole Electric Company. About fifty dealers of western Washington attended the affair.

J. A. Tobyn, operating engineer, The Washington Water Power Company, Spokane, spent a week in Seattle and vicinity recently in connection with matters relating to interchange of power between his company and the Puget Sound Power & Light Company. Mr. Tobyn is in charge of the operation of the seven hydroelectric plants of The Washington Water Power Company under the direction of **B. M. Merrill,** superintendent of light and power.

J. E. E. Royer, assistant general manager, **W. H. Ude,** director of public relations and **R. B. Childs,** commercial department, The Washington Water Power Company, Spokane, recently accompanied a delegation of Elks to Wallace, Idaho, where the new home of the Wallace Elks was formally dedicated.

J. R. Kearney, sales manager, W. N. Mathews Corporation, St. Louis, Mo., recently visited the Pacific Coast in the interests of his concern.

H. E. Sanderson, Bryant Electric Company, San Francisco, recently returned from an extended trip through the East where he visited the factory at Bridgeport, Conn.

O. C. Merrill, executive secretary of the Federal Power Commission, Washington, D. C., has received the honorary degree of Doctor of Science from Bates College.

V. G. Shinkle, L. A. Lewis, T. G. Aston, J. B. Fisken, A. C. Haggenmiller, A. H. Beckwith, L. E. Morse, E. Logan, R. B. McElroy, W. T. Ryan, B. H. Bishop, Gilbert Foster, James Fisken and **Richard McKay,** were among the golf enthusiasts of The Washington Water Power Company, Spokane, who attended the annual golf tournament held at Hayden Lake, Idaho. Mr. Shinkle won the first prize with a net score of 77.

F. E. Boyd, assistant sales manager, General Electric Company, San Francisco, recently returned from an extended trip throughout the East, visiting the company's factories at Schenectady, N. Y., Lynn, Mass., New York City and Fort Wayne, Ind.

C. A. Stirling, general manager of the Robbins & Myers Company of Canada, recently has been made manager of the New York sales office of that company. **K. C. Berney** succeeds Mr. Stirling.

Obituary

Tracy E. Bibbins, president of the Pacific States Electric Company and one of the pioneers in the electrical industry on the Pacific Coast, died at his home in Berkeley, Calif., July 3, 1925. Mr. Bibbins was born in San Francisco in 1866. He first became connected with the electrical industry in 1889 when he was employed in the construction of the first electric railway in Oregon, the Portland Albina Street road. Later he was transferred to the position of storkeeper of the construction company engaged in building the road. Shortly thereafter he entered the employ of the Edison Electric Manufacturing Company, which was then in the process of transmutation and shortly became the Edison General Electric Company and finally the General Electric Company. In 1898 he was attached to the San Francisco office of the company as clerk and rose through the positions of supply manager to local manager in 1912. The Pacific States Electric Company was formed in 1909 through the consolidation of three jobbing concerns, although Mr. Bibbins did not join it until 1916 when he became its president, a position he held until his death. Through his familiarity with merchandising problems Mr. Bibbins has been active in jobbing activities on

TRACY E. BIBBINS

the Pacific Coast for many years. He was one of the leaders in the formation of the California Electrical Cooperative Campaign. He was prominent in the affairs of the jobbers organizations and was president of the Pacific Division of the National Electrical Supply Jobbers' Association in 1919. Later he served on the executive board of this organization He has been prominent in all phases of cooperative electrical development in California. His sudden death marks the passing of another of the early pioneers who gave California the name of a leader in things electrical.

TRADE NOTES

The Okonite-Callender Cable Company, Inc., is the name of the new company recently formed to offer to the electrical industry in the United States impregnated paper cables made by the secret processes and under the patents of Callender's Cable & Construction Company, Ltd., of London, England. The new plant is located at Paterson, N. J., and was ready for production July 1. The company claims it will be complete in every detail, combining the latest and best practices of this country and Europe, together with specially designed Callender machinery. It also will contain a completely equipped electrical research laboratory, which will work in conjunction with Callender's research laboratory.

Circle F Manufacturing Company, Trenton, N. J., has issued a new booklet containing prices and descriptions of its Circle F shallow type switches.

Moore-Bird Company, Denver, Colo, has been designated as an authorized distributor of the Magnavox line of radio receiving sets and loud speakers.

Jefferson Electric Manufacturing Company, Chicago, has announced a new apparatus for rejuvenating radio tubes which are exhausted or paralyzed, that is claimed to be inexpensive and efficient.

The Sundh Electric Company, Newark, N. J., has added another addition to its plant to be used entirely for office purposes. This is the fourth addition since the company moved from New York to Newark in 1918.

National Lamp Works of General Electric Company, Cleveland, has announced changes in names and addresses of the various divisions as follows: Federal Miniature Lamp Division, 342 Madison Avenue, New York, to Federal Lamp Division, 441 Lexington Avenue; Shelby Lamp Division, Buffalo, N. Y., to Empire Lamp Division; Bryan Marsh Division, 623 South Wabash Avenue, Chicago, to Midland Lamp Division; Bryan Marsh Division, 642 Beaubien Street, Detroit, Mich., to Michigan Lamp Division; removal of offices of Bryan Marsh Division from Grand Central Terminal Building, New York, to 250 Park Avenue, that city.

Pittsburgh Reflector Company, Pittsburgh, Pa., recently has issued a new booklet which fully illustrates and describes its system of indirect lighting, and pictures its different types of reflectors.

Electric Heating & Manufacturing Company, Seattle, is constructing a new factory building at the corner of Sixth Avenue and Harrison Street, which will be ready for occupancy on July 1.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., describes various types of autovalve lightning arresters in its Circular 1695-A. The publication covers the general characteristics of surge voltages and the conditions from which they arise. Illustrations and charts of interest to engineers are contained in the circular.

Crouse-Hinds Company, Syracuse, N. Y., has issued a new folder fully illustrated and descriptive of its Arktite circuit-breaking plugs and receptacles.

Chicago Fuse Manufacturing Company, Chicago, has announced the opening of a new sales office at 2131 Railway Exchange Building, St. Louis, in charge of E. M. Miller.

A. G. Manufacturing Company, Seattle, manufacturers of switchboxes and electrical appliances, has awarded a general contract for the erection of a new factory building at a cost of $60.000.

Keystone Grinder & Manfuacturing Company, Pittsburgh, Pa., recently has brought out a new portable electric twist-drill grinder. The device is powered by a ¼-hp. Westinghouse a.c. motor fitted with cord and plug, and has many other features.

The Maytag Shop has opened new quarters at 1619 Third Avenue. Seattle, replacing the old shop at 1504 First Avenue. **G. W. Oberg,** general manager of the Washington division, is in charge with a sales staff of fifty-eight men.

The Electric Controller & Manufacturing Company, Cleveland, has issued recently Bulletin 1048, describing a new push-button-operated oil switch for starting squirrel-cage motors and also single-phase motors. It is claimed this starting switch throws the motor across the line when the "start" button is pressed, providing no-voltage, overload and phase-failure protection.

Ray D. Lillibridge, Inc., advertising agency of New York City, which handles a large number of electrical accounts, recently has changed its address to 8 West 40th Street in that city.

Horton Manufacturing Company, Fort Wayne, Ind., has placed a new electric washer on the market, the No. 34, which it claims is distinctively different. The company is issuing descriptive literature of this new model.

The Trumbull Electric Manufacturing Company, Plainville, Conn., recently has developed a new tumbler switch in a special galvanized finish box for use with fractional horsepower motors.

The Savage Arms Corporation, Utica, N. Y., has announced the "Spin-Rinse, Spin-Dry'" as an exclusive feature of its Savage washer and dryer, which it is claimed enables the user to rinse and dry an entire tubful of clothes within a few minutes and without handling the wash.

The Service Electric Store, Port Angeles, Wash., was damaged by fire recently, the damage being confined chiefly to stocks and fixtures. The building will be remodeled immediately and service resumed.

The Condit Electrical Manufacturing Company, Boston, has purchased a 15-acre tract with two high-grade brick buildings covering about 200,000 sq. ft. of floor space at Hyde Park, Mass., and now is completing a new brick structure on part of the property.

The Robbins & Myers Company, Springfield, Ohio, recently has issued a new circular, form No. 1257, illustrating and describing its new type "RF" fractional horsepower repulsion-induction motors.

Apex-Rotarex Stores has announced the opening of a new branch at 113 North University Avenue, Provo, Utah, under the management of P. J. Earl. It will handle a complete line of electrical appliances.

The Electric Home Company, 577 Seventeenth Street, Oakland, Calif., carrying a line of electric specialties for the home, has been appointed the representative of the Electro-Kold Corporation, Spokane, to handle the sale in Oakland of the electric home refrigerator made by that company. J. B. Sperry is manager of the Oakland company.

C. F. Braun & Company, manufacturers and engineers, Alhambra, Calif., and Tulso, Okla., recently have issued Bulletin 117. The bulletin is profusely illustrated with photographs and diagrams and contains a full description of the Braun absorption plants.

WHEN ROME BURNED

Electrified history as seen by the Western Electric Company, showing "why Nero failed to go on the air, thus losing one of history's best opportunities for broadcasting"